Final

Programmatic Environmental Assessment for Base General Plan Development

Schriever Air Force Base, Colorado

Prepared for:

50 Space Wing

Prepared by:

North Wind
A CIRI COMPANY

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FINDING OF NO SIGNIFICANT IMPACT FOR

BASE GENERAL PLAN DEVELOPMENT

SCHRIEVER AIR FORCE BASE, COLORADO

Pursuant to provisions of the National Environmental Policy Act (NEPA), 42 U.S. Code 4321 *et seq*, implementing Council on Environmental Quality (CEQ) Regulations, 40 Code of Federal Regulations (CFR) 1500-1508, and 32 CFR Part 989, *Environmental Impact Analysis Process* (EIAP), the U.S. Air Force (Air Force) conducted an assessment of the potential environmental consequences of the Base General Plan Development. This Environmental Assessment (EA), Programmatic Environmental Assessment for Base General Plan Development Schriever Air Force Base, Colorado, incorporated by reference in this finding, considers the potential impacts of the Proposed Action on the natural and human environments.

Proposed Action and Alternatives: The Proposed Action is for Schriever AFB to complete construction for various development projects across the installation as described in the Base General Plan. Activities will be implemented in general timeframes of one to five years, six to ten years, and more than ten years. The Preferred Alternative includes construction for the development of the following facilities within the one to five year timeframe (in no particular order of precedence):

Within the Community Center ADP:

- Security Forces operation facility
- Airman & family readiness center/chapel
- Addition to the fitness center
- Youth center
- Car wash
- Roller hockey field

Within the Land outside the Restricted Area (RA):

- Consolidated Security Forces training facility
- Improvements to the Enoch/Irwin Road intersection
- Military gas station
- 25 Space Control Tactics Squadron (SCTS) maintenance facility
- Electrical substation

Within the RA:

- Network Operations Group (NOG)/National Reconnaissance Office (NRO) Administrative Building
- Administrative Building
- Weather Station

Construction of these facilities will require the extension/improvement of existing infrastructure (i.e., roads, electricity, gas, water, and sanitary sewer lines). Additionally, Schriever AFB proposes to expand selected sidewalks (both width and length) as needed, and construct bike paths inside the RA.

Description of Alternatives Analyzed: In addition to the Preferred Alternative, two other alternatives (the No Action Alternative and the Accelerated Construction Alternative) were carried forward for analysis in the EA. Under the No Action alternative, the Air Force would not implement the Base General Plan at Schriever AFB.

Under the Accelerated Construction Alternative, facilities would be constructed at a more rapid pace than the timeline described in the Base General Plan. This alternative would include all components of the Preferred Alternative and would increase the pace of construction so that projects falling within the 2015 to 2021 timeframe would also be constructed by 2015. In addition to those projects included in the Preferred Alternative, the Accelerated Construction Alternative would include the following development projects within the one to five year timeframe:

Within the Community Center Area:

- Education center/library
- Fire station

Within the West Campus Area:

- Dining facility (Burger King)
- Services Mall within the West Campus ADP

Within the Non- Area Development Plan Land Outside the RA:

- Civil Engineering complex
- Transportation complex
- Addition to the medical/dental clinic
- Operations Squadron (OPS) administrative facility
- Antenna farm

Within the RA:

- Two Future RA mission buildings

As with the Preferred Alternative, implementation of this alternative would require the extension/improvement of existing infrastructure (i.e., roads, electricity, gas, water, and sanitary sewer lines).

Summary of Findings: Direct, indirect, and cumulative impacts regarding cultural resources, socioeconomics, environmental justice, hazardous materials and waste, air resources, human health and safety, noise, land use and visual resources, geologic resources, water resources, biological resources, utilities and infrastructure, and transportation were analyzed for the proposed and alternative actions at Schriever AFB. The table below indicates the anticipated level of impacts for each resource area:

Resource	Preferred Alternative	Accelerated Construction Alternative	No Action Alternative
Cultural Resources	No Impact	No Impact	No Impact
Socioeconomics	Slight Positive Impact	Slight Positive Impact	No Impact
Environmental Justice	No Impact	No Impact	No Impact
Hazardous Materials and Waste	Insignificant Impact	Insignificant Impact	No Impact
Air Resources	Insignificant Impact	Insignificant Impact	No Impact
Human Health and Safety	No Impact	No Impact	No Impact
Noise	Insignificant Impact	Insignificant Impact	No Impact
Land Use and Visual Resources	Insignificant Impact	Insignificant Impact	No Impact
Geologic Resources	Insignificant Impact	Insignificant Impact	No Impact
Water Resources	Insignificant Impact	Insignificant Impact	No Impact
Biological Resources	Insignificant Impact	Insignificant Impact	No Impact
Utilities and Infrastructure	Insignificant Impact	Insignificant Impacts	No Impact
Transportation	Slight Positive Impact	Slight Positive Impact	No Impact

Any Plans, standards, or practices required by local, state, or federal law or USAF regulation will be strictly adhered to in an effort to avoid or minimize impacts to the resources. This includes best management practices (BMPs) commonly required in construction or renovation contracts for resource protection at Schriever AFB. Therefore, the analysis in the EA concluded the following:

- There will be no significant impact from the Proposed Action to cultural resources, socioeconomics, environmental justice, hazardous materials and waste, air resources, human health and safety, noise, land use, and visual resources, geological resources, water resources, biological resources, utilities and infrastructure, or transportation.

- The Proposed Action is not expected to contribute appreciably to cumulative environmental impacts when considered in the context of other projects that have recently been completed, are currently under construction, or are anticipated in the near future.

FINDING OF NO SIGNIFICANT IMPACT

Based upon my review of the facts and analyses contained in the attached EA, conducted in accordance with the provisions of NEPA, the CEQ Regulations, and 32 CFR Part 989, I conclude that the Proposed Action will not have a significant environmental impact, either by itself or cumulatively with other ongoing projects at Schriever AFB, will not involve an element of high risk or uncertainty on the human environment, and its effects on the quality of the human environment are not highly controversial. Accordingly, an Environmental Impact Statement is not required. The signing of this Finding of No Significant Impact (FONSI) completes the environmental impact analysis process.

APPROVED BY:

4 Sep 12

JAMES P. ROSS, Colonel, USAF — DATE
Commander, 50th Space Wing

NWI-10392-004

Final

Programmatic Environmental Assessment for Base General Plan Development Schriever Air Force Base, Colorado

June 2012

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ACRONYMS AND ABBREVIATIONS

AAFES	Army and Air Force Exchange Services
ADP	Area Development Plan
AFB	Air Force Base
AFCEE	Air Force Center for Engineering and the Environment
AFI	Air Force Instruction
AFPD	Air Force Policy Directive
AFSPC	Air Force Space Command
APEN	Air Pollutant Emission Notice
AQCR	Air Quality Control Region
BMP	best management practice
CAA	Clean Air Act
CDOW	Colorado Division of Wildlife
CDPHE	Colorado Department of Public Health and Environment
CDWR	Colorado Division of Water Resources
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH_4	methane
CMD	Cherokee Metropolitan District
CNHP	Colorado Natural Heritage Program
CO	Carbon monoxide
CO_2	Carbon dioxide
CWA	Clean Water Act
dB	decibel
dBA	"A-weighted" decibel
DNL	day-night average sound level
DoD	Department of Defense
EA	Environmental Assessment
EISA	Energy Independence Security Act
EO	Executive Order
EPAct	Energy Policy Act of 2005
EPCPD	El Paso County Planning Department
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FFPA	Farmland Protection Policy Act
FIRM	Flood Insurance Rate Maps
FONSI	Finding of No Significant Impact
GHG	Greenhouse Gases
GIS	Geographic Information System
HAPs	Hazardous air pollutants
HAZMAT	Hazardous Material
HVAC	heating, ventilation, and air conditioning
HUD	U.S. Housing and Urban Development
INRMP	Integrated Natural Resources Management Plan
kV	kilovolt
LBP	lead-based paint
Leq	equivalent sound level
MCF	million cubic feet

msl	mean sea level
MVEA	Mountain View Electrical Association
MW	megawatt
MWH	megawatt hour
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO_2	nitrogen dioxide
NO_x	Nitrogen oxide
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRO	National Reconnaissance Office
O_3	Ozone
OPS	Operations Squadron
OSHA	Occupational Safety and Health Administration
Pb	Lead
PM	particulate matter
PM_{10}	Particulate matter less than or equal to 10 micrometers
$PM_{2.5}$	Particulate matter less than or equal to 2.5 micrometers
PPE	personal protective equipment
ppm	parts per million
PSD	Prevention of Significant Deterioration
RA	Restricted Area
ROI	Region of Influence
SCTS	Space Control Tactics Squadron
50 SFS	Security Forces Squadron
SIDC	Space Innovation and Development Center
SO_2	Sulfur dioxide
SW	Space Wing
SWPPP	Stormwater Pollution Prevention Plan
TSAT	Transformational Satellite Communications System
$\mu g/m^3$	micrograms per cubic meter
UPS	Uninterruptible Power Supply
USACE	United States Army Corps of Engineers
USAF	Unites States Air Force
USC	United States Code
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Services
USGS	United States Geological Survey
UST	underground storage tank
VOCs	volatile organic compounds

ORGANIZATION OF THE DOCUMENT

The following is an Environmental Assessment (EA) for General Plan Development at Schriever Air Force Base (AFB), Colorado. The EA is organized into the following sections:

- *Section 1 – Purpose of and Need for Action*: describes the purpose of and need for the project as well as the general extent of proposed project activities.

- *Section 2 – Description of the Proposed Action and Alternatives*: provides background information for the project and describes the Proposed Action in detail. Also included in this section is a description of the alternatives that were considered for achieving the stated purpose, including any alternatives that were eliminated from detailed study.

- *Section 3 – Affected Environment*: provides a description of existing resources that have the potential to be affected by the Proposed Action Alternatives and the No Action Alternative.

- *Section 4 – Environmental Consequences*: describes the environmental effects of implementing the Preferred Action Alternative, the No Action Alternative, and any other alternatives carried forward for analysis. The analysis is organized by resource and considers both direct and indirect effects. The effects of the No Action Alternative provide a baseline for evaluation and comparison. Mitigations and actions included in the Proposed Action that may be taken to reduce impacts to resources are also discussed.

- *Section 5 – List of Preparers*: provides information regarding the interdisciplinary staff involved in preparing the EA.

- *Section 6 – Persons and Agencies Consulted*: lists those persons and agencies either consulted during preparation of the EA or sent a copy of the Draft EA for review and comment.

- *Section 7 – References*: provides citations for documents and other materials used to prepare the EA.

Final
Programmatic Environmental Assessment for Base General Plan Development Schriever Air Force Base, Colorado

1. PURPOSE OF AND NEED FOR ACTION

1.1 Introduction

This section describes the purpose of and need for the 50 Space Wing's (50 SW) proposal to construct facilities and other amenities to support existing and future missions, provide Base support, and improve the quality of life at Schriever Air Force Base (AFB) in accordance with the General Plan (USAF 2009). It also provides summaries of the scope of the environmental review and the applicable regulatory requirements.

Federal agencies are required to consider the environmental consequences of proposed actions in the decision-making process under the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] Sections 4321 to 4370d), the Council on Environmental Quality's (CEQ) implementing regulations (40 Code of Federal Regulations [CFR] Parts 1500–1508), and the Department of the Air Force Environmental Impact Analysis Process (32 CFR Part 989). This Environmental Assessment (EA) for the implementation of the five-year portion of the General Plan at Schriever AFB is being prepared in accordance with NEPA. This EA evaluates the potential environmental impacts associated with the implementation of the General Plan over the next five years.

Schriever AFB occupies 3,840 acres along the Rocky Mountain Front Range in central El Paso County, Colorado. It is situated 8 miles east of Peterson AFB, approximately 10 miles east of Colorado Springs, Colorado, and 7.5 miles west of the town of Ellicott (Figure 1). The Base is accessed from Colorado Highway 94 via Enoch Road, or from Bradley Road via Curtis Road and Irwin Road. Schriever AFB is home to the 50 SW. The 50 SW's mission is to provide command and control for Department of Defense (DoD) military satellites and to manage the worldwide Air Force Satellite Control Network. Mission activities are conducted inside a fenced 640-acre Restricted Area (RA) located within the 2-mile-by-3-mile installation boundaries (Figure 2). Schriever AFB was originally established as Falcon Air Force Station in 1983. The original Base was limited to the existing RA, much of which has since been developed. Schriever AFB is surrounded by grasslands and ranches in a sparsely populated setting.

The United States Air Force (USAF) proposes to construct facilities and other amenities to support existing and future missions, provide Base support, and improve the quality of life at Schriever AFB in accordance with the General Plan (USAF 2009). Implementing the General Plan as evaluated in this EA would allow USAF units to carry out their assigned responsibilities in ways that fully satisfy mission requirements, foster safe operational practices, and protect human health and the environment.

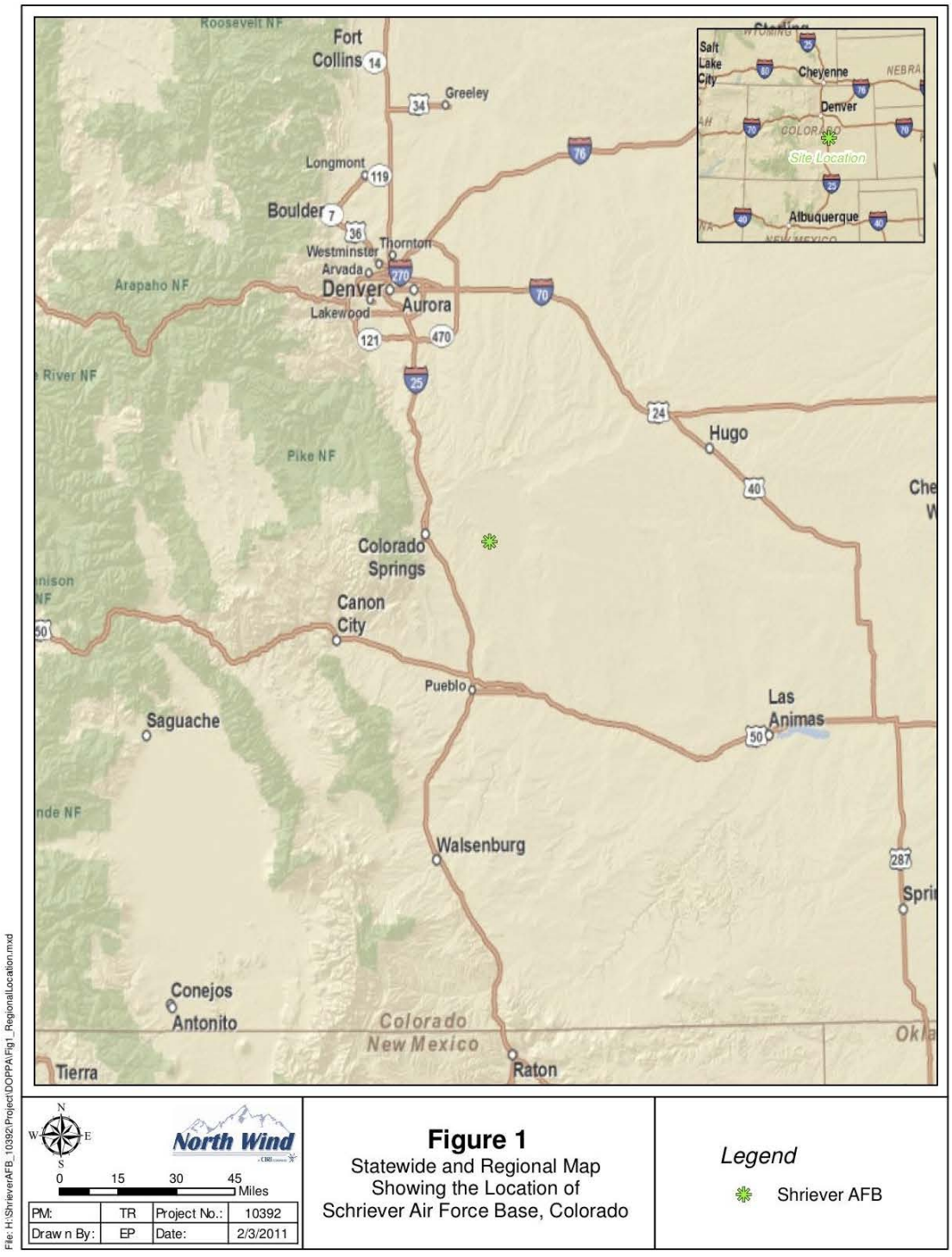

Figure 1. Statewide and regional map showing the location of Schriever Air Force Base, Colorado.

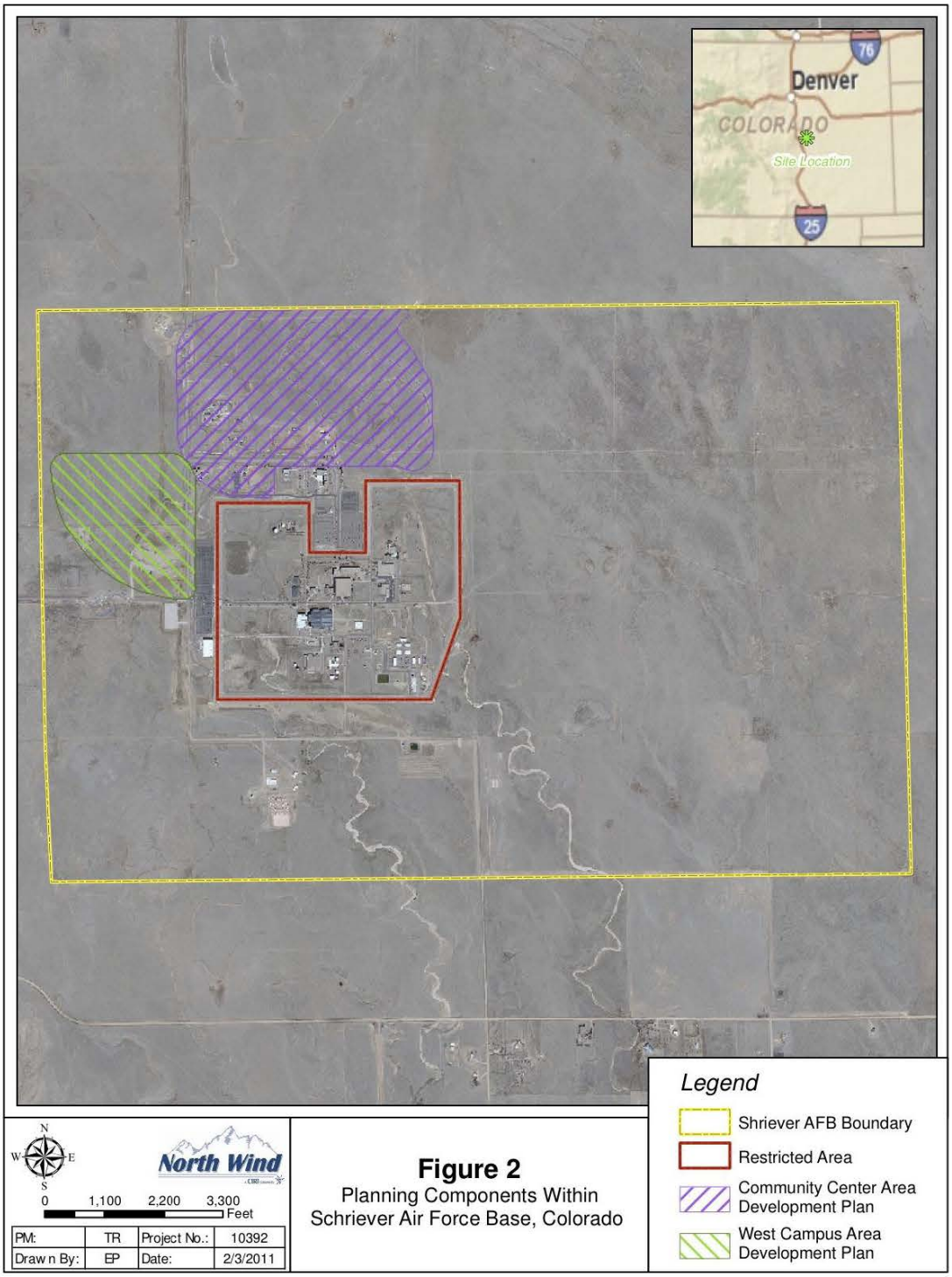

Figure 2. Planning areas within Schriever Air Force Base, Colorado.

1.2 Purpose of and Need for the Proposed Action

The purpose of the Proposed Action is to implement the General Plan for Schriever AFB. Goals of the General Plan are to achieve optimal land use planning, protect the natural and human environment, and plan for future mission growth. The Proposed Action includes construction projects to improve infrastructure (utilities and roads) and to construct new facilities identified in the General Plan.

In accordance with the Schriever AFB General Plan and more recent planning decisions, the Proposed Action is needed to support the current mission and future mission growth, and to improve environmental quality, recreation opportunities, and the safety and medical functions on Base. According to space utilization surveys, the Base is currently five percent over capacity, which could negatively affect the ability of Schriever AFB personnel to perform their duties efficiently and effectively (USAF 2009).

The General Plan is a summary document of the Base Comprehensive Plan and was prepared in response to Air Force Instruction (AFI) 32-7062, *Air Force Comprehensive Planning*, and *Air Force Space Command (AFSPC) Supplement 1*. The plan provides the 50 SW senior leadership with an evaluation of the potential impacts of proposed developments and possible effects on the physical and human environment. The General Plan is intended to be the principal document for assessing and planning installation growth and development. Plans and programs for future construction must follow the guidelines established in the General Plan, and the Schriever AFB Facilities Board must approve any deviations after coordination with AFSPC.

1.2.1 General Design Requirements

In accordance with Air Force sustainability principles and applicable requirements, the proposed facilities would be designed and constructed to comply with current and emerging Green Infrastructure/Low-Impact Development requirements of Federal Proposed Actions, including:

- Executive Order (EO) 13423, *Strengthening Federal Environmental, Energy, and Transportation Management* (24 January 2007). This EO requires federal agencies to conduct their environmental, transportation, and energy-related activities, including new construction, in an environmentally, economically, and fiscally sound, integrated, continuously improving, efficient, and sustainable manner.
- EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance* (5 October 2009). This EO requires that federal agencies increase energy efficiency; measure, report, and reduce their greenhouse gas (GHG) emissions; conserve and protect water resources; eliminate waste, recycle, and prevent pollution; endeavor to acquire sustainable technologies and environmentally preferable materials, products, and services; design, construct, maintain, and operate high-performance, sustainable buildings; and strengthen the vitality and livability of the community in which the Federal facility is located.
- Section 438 of the Energy Independence Security Act (EISA), dated 19 December 2007. The EISA requires that for Federal development and redevelopment projects, the proponent ensures that any Federal facility with a proposed disturbance area exceeding 5,000 square feet maintain or restore the pre-development hydrology of the property to the maximum extent technically feasible, with regard to temperature, rate, volume, and duration of flow.

- Energy Policy Act (EPAct) of 2005, dated 8 August 2005.

As part of the design process, Schriever AFB would specifically comply with the DoD's Policy Concerning Implementation of Stormwater Requirements under Section 438 of the EISA (Office of the Under Secretary of Defense 2010), and the U.S. Environmental Protection Agency's (USEPA's) Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the EISA (USEPA 2009).

The General Plan divides the Base into four components to facilitate planning. Two of these areas are approved Area Development Plans (ADPs). The ADPs depict portions of the installation proposed or reserved for development. The two approved ADPs on Schriever AFB are the Community Center ADP and the West Campus ADP. The remainder of the installation includes areas outside the RA, and land within the RA (**Figure 2**). These four areas are described below.

1.2.2 Community Center Area Development Plan

The Community Center ADP is located north of the RA and encompasses approximately 310 acres. Falcon Parkway, Hahn Avenue, and Voyager Roads serve this area. It is bordered on the east by a privatized military housing area for which construction began in 2008. This ADP is partially developed with community facilities (e.g., Child Development Center, medical clinic, security forces, fitness center [and other recreational amenities], and a shoppette). The majority of the Community Center ADP is currently undeveloped. Currently there are electric, gas, sanitary sewer, and water lines extending to existing developed areas.

1.2.3 West Campus Area Development Plan

The West Campus ADP is located southwest of the intersection of Falcon Parkway and Enoch Road and encompasses 132 acres. The area is served by Irwin Avenue, Enoch Road, and Blue Road — all of which are paved two-lane roads. Currently, this ADP is largely undeveloped, with the exception of the West Gate, the Space Innovation and Development Center, the 310 Wing Headquarters, and small industrial facilities along Blue Road at the western end of the ADP. Currently there are electric, gas, and water lines east of Enoch Road.

1.2.4 Non-Area Development Plan Land Outside the Restricted Area

This area includes all installation lands that are not included in the Community Center ADP, the West Campus ADP, or the RA. The vast majority of the area is currently undeveloped and is composed of native short-grass prairie. The area north of the northeast corner of the RA has recently been developed as privatized military housing. The area immediately south of the RA is partially developed (e.g., warehouses, recreational vehicle parking, and a fire training facility). This area is served by Enoch Road (which is unpaved in this area) and local gravel roads provide vehicular access to these portions of the installation. In the areas south and east of the RA, there is electric and water supply in the locale, but not natural gas. Sanitary sewers serve the area.

1.2.5 The Restricted Area

The RA encompasses 640 acres and is substantially developed with mission and support facilities (primarily in the central and southern portions). The area is served by Irwin Avenue, Kepler Avenue, Beltway Road, and numerous access roads to facilities. Some of the western part of the RA is undeveloped grassland. The eastern part of the RA includes a drainage way, which limits development. The developed portion of the RA is currently served by all utilities.

1.3 Scope of the Analysis

This EA identifies, describes, and evaluates the potential environmental impacts that may result from implementation of the five-year component of the General Plan (Alternative 1, the Preferred Alternative), implementation of the accelerated construction alternative (Alternative 2), and from the no action alternative. As appropriate, the affected environment and environmental consequences of the alternatives are described in terms of site-specific descriptions or a regional overview. Finally, the EA identifies measures to reduce impacts or best management practices (BMPs) to prevent or minimize environmental impacts, if required.

The resources that could be impacted and are analyzed in the EA include air quality, human health and safety, noise, land use and visual resources, geology and soils, water resources, biological resources, transportation, utilities and infrastructure. Socioeconomics, environmental justice, hazardous and toxic materials and waste, and cultural resources are not analyzed in detail in this EA, but are briefly discussed in **Section 3.1**.

1.4 Regulatory Framework

Federal, state, and local laws and regulations potentially applicable to this Proposed Action are specified, where appropriate, within this EA, and include, but are not limited to:

- Air Force Policy Directive (AFPD) 91-2 – Safety Programs (28 September 1993);
- Migratory Bird Treaty Act, 16 USC 703-712, 3 July 1918, as amended 1936, 1960, 1968, 1969, 1974, 1978, 1986, and 1989);
- Endangered Species Act (ESA) of 1973, as amended (7 USC 136; 16 USC 1531 *et seq*.);
- National Historic Preservation Act of 1966, as amended (36 CFR Part 800);
- Federal Clean Air Act (CAA) of 1990 (42 USC §7401 *et seq*., as amended);
- Native American Graves Protection and Repatriation Act, as amended (25 USC 3001 *et seq*.);
- Federal Water Pollution Control Act, or Federal Clean Water Act (CWA), of 1972, as amended; Sections 401 and 404;
- EO 11988, *Floodplain Management* (24 May 1977);
- EO 11990, *Protection of Wetlands* (24 May 1977);

- EO 13175, *Consultation and Coordination with Indian Tribal Governments* (6 November 2000);
- EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (11 February 1994);
- EO 13045, *Protection of Children From Environmental Health Risks and Safety Risks* (21 April 1997), as amended by EO 13296 (23 April 2003);
- EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management* (24 January 2007);
- EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance* (5 October 2009);
- Section 438 of the EISA (19 December 2007); and
- EPAct of 2005 (8 August 2005).

1.5 Interagency Coordination and Public Involvement

NEPA requirements help ensure that environmental information is made available to the public during the decisionmaking process and prior to actions being taken. The premise of NEPA is that the quality of Federal decisions is be enhanced when proponents provide information to the public and involve the public in the planning process. The Intergovernmental Coordination Act and EO 12372, Intergovernmental Review of Federal Programs, require Federal agencies to cooperate with and consider state and local views in implementing a Federal proposal. AFI 32-7060, *Interagency and Intergovernmental Coordination for Environmental Planning* (IICEP), requires the USAF to implement an agency coordination process, which is used for the purpose of facilitating and receiving agency input and implements scoping requirements.

Through the IICEP process, Schriever AFB provided the Draft EA and Draft Finding of No Significant Impact (FONSI) to potentially interested Federal, state, and local agencies; Native American tribes; and other stakeholder groups and provided them sufficient time to make known their environmental concerns specific to the action. The IICEP process also provided Schriever AFB the opportunity to cooperate with and consider state and local views in implementing the Federal proposal. All IICEP materials related to this EA are included in **Appendix A**.

A Notice of Availability (NOA) for the Draft EA was published in the *Colorado Springs Gazette* on 17 July 2011. This initiated the 30-day public review period. The NOA was issued to solicit comments on the Proposed Action and involve the local community in the decisionmaking process. Copies of the Draft were made available for review at the Pikes Peak Library District East Library. At the conclusion of the review period, no public comments had been received. Two responses from relevant Federal, state, tribal, and local agencies were received and their comments were incorporated into the analysis of potential environmental impacts performed as part of this EA, where applicable. **Appendix A** contains additional details about the public comment period.

2. DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

This section describes the Proposed Action Alternatives and the No Action Alternative. Proposed Action Alternatives include the Preferred Alternative and an Accelerated Construction Alternative.

2.1 Alternative 1 — Preferred Alternative

In accordance with AFI 32-7062 (and AFI 32-7062 *AFSPC Supplement 1*), the General Plan outlines the planned development of the Base over a period of 20 years. However, much of the long-range planning is subject to change. Therefore, the Preferred Alternative for the Proposed Action focuses on the scheduled development through construction before or during 2015 (i.e., the five-year component of the General Plan). The following subsections describe the activities proposed for construction, and the infrastructure requirements needed to develop facilities in these areas. The proposed activities are also shown on **Figure 3** and are listed in **Table 1**.

Some components of the five-year plan have already undergone individual NEPA analysis (i.e., the 310 Wing Headquarters building, the solar farm, and the wind farm) and are therefore not included in the Preferred Alternative.

2.1.1 Community Center Area Development Plan

The Preferred Alternative would include the following development within the Community Center ADP:

- Security Forces Squadron (SFS) Operation Facility;
- Airman & Family Readiness Center/Chapel;
- Addition to the Fitness Center;
- Youth Center;
- Car Wash; and
- Roller Hockey Field.

In addition to the proposed construction projects, implementation of the Preferred Alternative would require the extension/improvement of existing infrastructure (i.e., roads, electricity, gas, water, and sanitary sewer lines).

2.1.2 West Campus Area Development Plan

The Preferred Alternative does not include any development within the West Campus ADP.

2.1.3 Non-Area Development Plan Land Outside the Restricted Area

Proposed future development under the Preferred Alternative includes:

- Consolidated Security Forces Training Facility;

- Improvements to the Enoch/Irwin Road intersection to facilitate traffic flow;
- Military gas station;
- 25 Space Control Tactics Squadron (SCTS) maintenance facility; and
- Electrical substation.

Construction of these facilities would require the extension/improvement of existing infrastructure (i.e., roads, electricity, gas, water, and sanitary sewer lines).

2.1.4 Area within the Restricted Area

Proposed future development within the RA under the Preferred Alternative includes:

- Network Operations Group (NOG)/National Reconnaissance Office (NRO) Administrative Building;
- Administrative Building; and
- Weather Station.

Additionally, Schriever AFB proposes to expand selected sidewalks (both width and length) as needed, and construct bike paths at various, to-be-determined as needed areas, inside the RA.

2.2 Alternative 2 — Accelerated Construction

An alternative to the Preferred Alternative is constructing facilities at a more rapid pace than the General Plan indicates. This alternative would include all components of the Preferred Alternative and would increase the pace of construction so that projects falling within the 2015 to 2021 timeframe would be constructed by 2015. The following subsections describe the activities proposed for construction in these areas and the infrastructure requirements needed to develop facilities in these areas. Activities implemented under the Accelerated Construction Alternative are shown on **Figure 3** and include all projects listed on **Table 1** and **Table 2**.

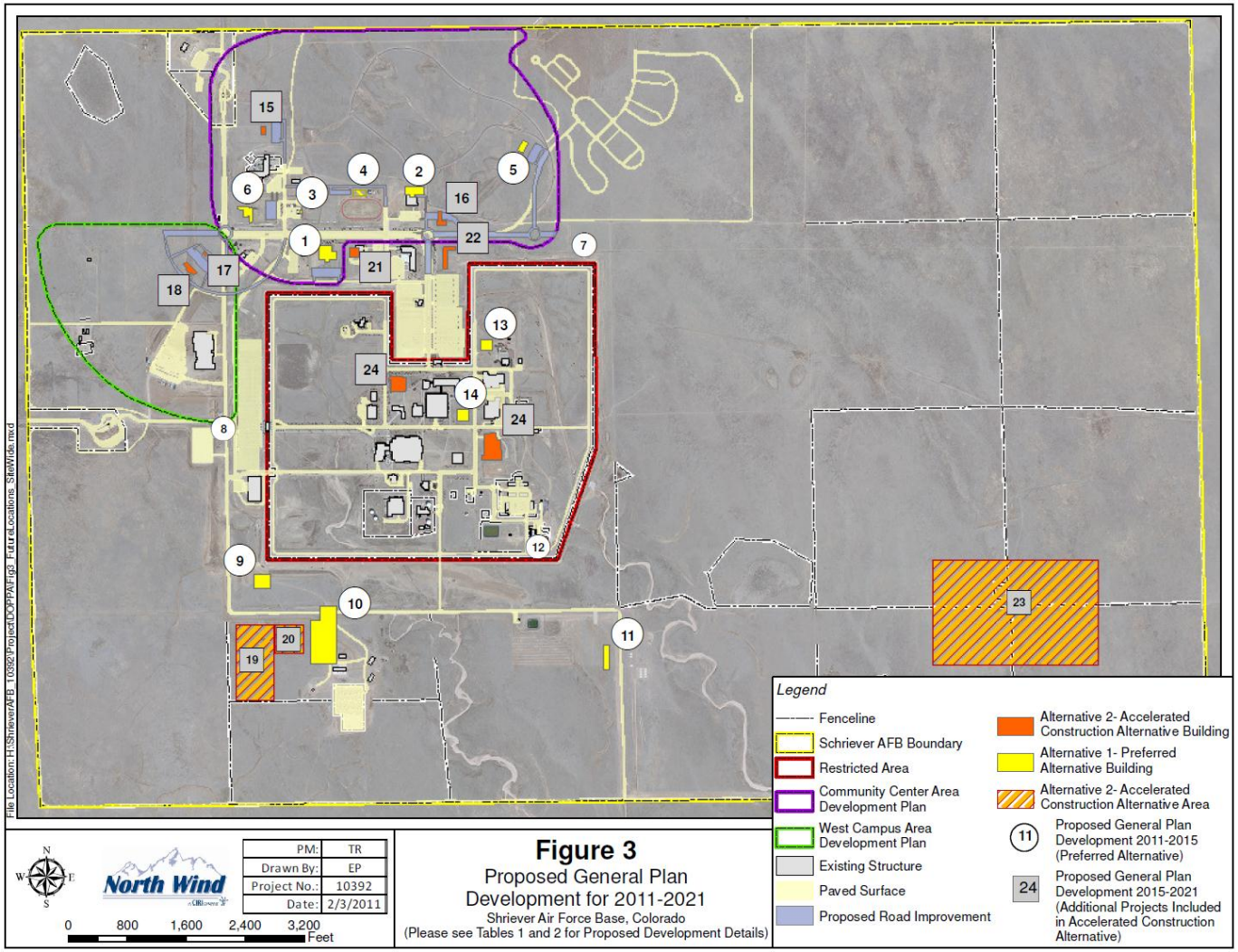

Figure 3. Proposed General Plan development for 2011-2021.

Table 1. Activities included in Alternative 1 – Preferred Alternative.

Area	Proposed Component	Approx. Extent (square feet)	Projected Timeline	ID Number (Figure 3)
Community Center ADP	Security Forces Operation Facility	41,900	2015	1
	Addition to Fitness Center	24,000	2014	2
	Car Wash	2,000	2009-2014	3
	Roller Hockey field	16,000	2009-2014	4
	Youth Center	12,000	2009-2014	5
	Airman & Family Readiness Center/Chapel	26,000	2012	6
West Campus ADP	None	--	--	
Outside the RA (Non-ADP)	Electrical Substation	5,000	2015	7
	Enoch/Irwin Road Improved Intersection	--	2009-2014	8
	Military Gas Station	5,000	2009-2014	9
	25 SCTS Maintenance Facility	253,000	2009-2014	10
	Consolidated SFS Training Facility	27,000	2013	11
Inside the RA (Non-ADP)	Weather Station	10	2009-2014	12
	Network Operations Group/ National Reconnaissance Office (NOG/NRO) Building	16,000	2009-2014	13
	Administrative Building	24,000	2009-2014	14
	Sidewalks and Bicycle Paths	90,000	2010-2014	NA
All	Road/Parking Improvement	443,000	2010-2014	NA
Total approximate square feet [acres]		1,120,910 [25.7]		

Note: the extents listed above were calculated by adding 20 percent to Government-provided footprints/extents to account for temporary disturbances from construction.

Table 2. Additional activities included in Alternative 2 – Accelerated Construction Alternative.

Area	Proposed Component	Approx. Extent (square feet)	Projected Timeline	ID Number (Figure 3)
Community Center ADP	Education Center/Library	8,800	2021	15
	Fire Station	19,100	2017	16
West Campus ADP	Dining Facility (Burger King)	2,900	2015-2021	17
	Services Mall	15,900	2018	18
Outside the RA (Non-ADP)	Civil Engineer Complex*	642,000	2018	19
	Transportation Complex*	186,400	2015-2021	20
	Addition to Medical/Dental Clinic	18,700	2015-2021	21
	OPS Administrative Facility	29,200	2019	22
	Antenna Farm*	3,863,500	2015-2021	23
Inside the RA (Non-ADP)	Two Future RA Mission Buildings	150,500	2015-2021	24
Total approximate square feet [acres]		4,937,000 [113]		

* The extent listed for these items includes the entire conceptual footprint (the actual extent would likely be less, although the actual extent will not be known until more detailed designs are completed).

Note: the extents listed above were calculated by adding 20 percent to Government-provided footprints/extents to account for temporary disturbances from construction.

2.2.1 Community Center Area Development Plan

The Accelerated Construction Alternative would include (in addition to those projects listed in **Section 2.1.1**) the following development within the Community Center ADP:

- Education Center/Library, and
- Fire Station.

As with the Preferred Alternative, implementation of this alternative would require the extension/improvement of existing infrastructure (i.e., roads, electricity, gas, water, and sanitary sewer lines).

2.2.2 West Campus Area Development Plan

The Accelerated Construction Alternative would include the construction of:

- Dining Facility (Burger King), and

- Services Mall.

The development of these facilities would require the extension/improvement of existing infrastructure (i.e., roads, electricity, gas, water, and sanitary sewer lines).

2.2.3 Non-Area Development Plan Land Outside the Restricted Area

In addition to the proposed future development included in the Preferred Alternative (**Section 2.1**), the Accelerated Construction Alternative would include the following development within the next five years:

- Civil Engineer Complex,
- Transportation Complex,
- Addition to the Medical/Dental Clinic,
- Operations Squadron (OPS) Administrative Facility, and
- Antenna Farm.

Construction of these facilities would require the extension/improvement of existing infrastructure (i.e., roads, electricity, gas, water, and sanitary sewer lines).

2.2.4 Area within the Restricted Area

Proposed future development within the RA under the Accelerated Construction Alternative includes:

- Two future RA mission buildings.

2.3 Alternative 3 — No Action Alternative

Under the No Action Alternative, Schriever AFB would continue to maintain existing facilities and new facilities for the Base would not be constructed in accordance with the General Plan. This alternative would significantly impair the Base's ability to conduct current and future missions and to maintain and improve the quality of life for Base personnel.

While the No Action Alternative would not satisfy the purpose of or need for action, this alternative was retained to provide a comparative baseline against which to analyze the effects of the Proposed Action as required under Federal law.

3. AFFECTED ENVIRONMENT

The affected environment is the baseline against which potential impacts caused by the Proposed Action and alternative actions are assessed. As stated in 40 CFR 1508.14, the potentially affected human environment is interpreted comprehensively to include natural and physical resources and the relationship of people with the resources. In compliance with the NEPA, CEQ regulations, and 32 CFR 989, the description of the affected environment focuses on those resources and conditions potentially subject to effects, laying the groundwork for the discussions in **Section 4** of the potential for environmental impacts to each resource. As such, relevant natural and physical resources were selected for description in this section. **Figure 4** depicts environmental resources present on Schriever AFB.

Information presented in this section serves as a baseline from which to identify and evaluate any individual or cumulative environmental and socioeconomic changes likely to result from implementation of the Proposed Action (including the Preferred Alternative and the Accelerated Construction Alternative) and the No Action Alternative. Existing environmental, cultural, and socioeconomic conditions within the Proposed Action's Region of Influence (ROI) are discussed. For the purposes of this analysis, the ROI is defined as the 3,840-acre Schriever AFB (i.e., the Site) and its general vicinity. Information is presented in this section to the level of detail necessary to support the analysis of potential impacts in **Section 4**, Environmental Consequences.

Resource information for this EA was obtained through review of existing environmental documents, available Geographic Information System (GIS) data for the Proposed Action sites, field observations, and communications with Schriever AFB staff, regulatory agencies, and other agencies and organizations. Qualified technical Subject Matter Experts examined each Proposed Action component for its potential effects on each technical resource area considering the components and scope of the Proposed Action and available resource information. The examination resulted in certain resources being dismissed from detailed analysis. Those resources that were dismissed are addressed in **Section 3.1**.

3.1 Resources Eliminated From Further Analysis

Schriever AFB, as encouraged by the CEQ Regulations, endeavors to keep NEPA analyses as concise and focused as possible. This is in accordance with CEQ Regulations at 40 CFR Part 1500.1(b) and 1500.4(b): "…NEPA documents must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail…prepare analytic rather than encyclopedic analyses."

Resource areas that were eliminated from further analysis for this EA include socioeconomics, environmental justice, hazardous and toxic materials and waste, and cultural resources. These resource areas are discussed briefly in the sections that follow. Included for each is the rationale as to why the resource was not retained for further analysis.

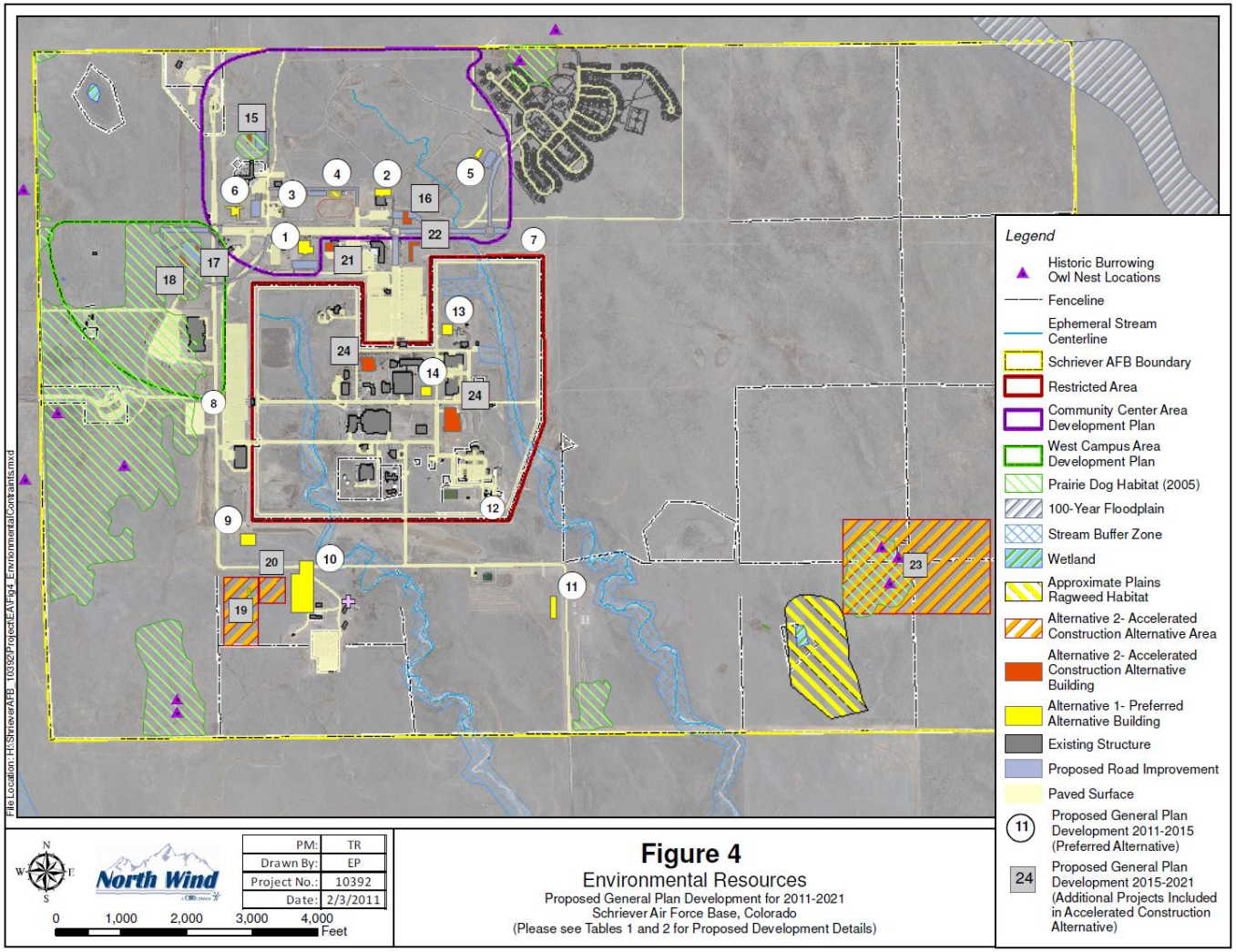

Figure 4. Environmental Resources, Schriever Air Force Base, Colorado.

3.1.1 Cultural Resources

Cultural resources are archaeological and historical items or places considered important to a culture, community, tradition, religion, or science. Schriever AFB has been completely surveyed for historic and archaeological resources. Five separate surveys were conducted between 1982 and 1997 and included Cold War historic sites. Since the surveys did not identify any sites within the boundaries of the Base eligible for the National Register of Historic Places (USAF 2004), Schriever AFB was granted an Integrated Cultural Resources Management Plan waiver from Headquarters, AFSPC in 2010. Due to the negative results of past comprehensive surveys at Schriever AFB[1], cultural resources were not further analyzed in this EA.

3.1.2 Socioeconomics and Environmental Justice

Socioeconomics and environmental justice are not analyzed in this EA. Socioeconomics are defined as the basic attributes and resources associated with the human environment, particularly population, housing, and economic activity. The considered alternatives would not result in nor are predicated on a mission change that would alter the population, demographics, or employment conditions at Schriever AFB. There would be minimal, short-term beneficial impacts to local employment and income from construction of the proposed facilities, and minor beneficial impacts due to employment at some of the proposed facilities (i.e., the dining facility and services mall). However, overall impacts to the local economy would be very minor, and therefore were not further analyzed in this EA.

Additionally, neither action alternative involves any activities that would contribute to changes in low-income or minority populations. Therefore, a detailed examination of environmental justice is not further evaluated in this EA.

3.1.3 Hazardous and Toxic Materials and Waste

Hazardous materials are substances that, because of their quantity, concentration, or physical, chemical, or infectious characteristics, may present a substantial danger to public health or the environment if released. The use or release of a hazardous material usually results in the generation of a hazardous waste. Only small amounts of hazardous materials (such as sealants) would be utilized in construction of the proposed facilities, and any hazardous waste generated would be disposed of in accordance with applicable regulations. Although some minor, partial building demolition would be conducted as part of the additions to the fitness center and medical/dental clinic, these buildings do not contain asbestos-containing materials (ACM) or lead-based paint (LBP).[2] Therefore, hazardous materials and wastes were not further analyzed.

[1] No archaeological survey, regardless of how intensive, precludes the possibility that an archaeological site may be discovered or re-evaluated during subsequent investigative, construction, or clearing activities. In the event that unrecorded cultural resources are discovered in the course of development, all work must stop immediately in the vicinity of the cultural resource, the Schriever AFB Cultural Resource Manager must be notified, and the resources must be evaluated for eligibility for listing on the National Register of Historic Places in consultation with the Colorado Historic Society.

[2] A letter issued by AFSPC, dated 17 November 1988, states that the installation does not have any asbestos-containing materials in its facilities (SAFB 1988). With regards to LBP, Schriever AFB was activated in 1985, following the Federal ban on LBP. As such, the buildings at Schriever AFB are not expected to contain LBP.

3.2 Resources Retained for Further Analysis

Resources retained for further analysis include those that have the potential to be affected by the Proposed Action. Resources identified for further analysis for this EA are described in **Sections 3.2.1 through 3.2.9**. They include: *air resources, human health and safety, noise, land use and visual resources, geologic resources, water resources, biological resources, utilities and infrastructure, and transportation.*

3.2.1 Air Resources

This section discusses the climate and meteorology of the area, air quality standards, regional air quality, and existing air pollutant sources.

3.2.1.1 Definition of the Resource

Air quality is determined by the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin (in particular, features such as mountains or basins which inhibit the dispersion of pollutants), and the prevailing meteorological conditions (temperature, wind speed and direction, and temperature inversions). Pollutant concentrations are generally highest with a calm atmosphere or with a strong temperature inversion, where pollutants are trapped near the surface by warm air aloft. These conditions are more common in the autumn and winter.

Air quality in a given location is described by the concentration of various pollutants in the atmosphere, generally expressed in units of parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). The significance of a pollutant concentration is determined by comparing it to Federal and state ambient air quality standards. These standards represent the maximum allowable atmospheric concentration that may occur and still protect public health and welfare, with a reasonable margin of safety.

3.2.1.2 Climate

Schriever AFB lies at an elevation of 6,300 feet above sea level on the western border of the Great Plains, just east of the Front Range of the Rocky Mountains, and 10 miles east of the city of Colorado Springs, Colorado. The climate of this area is classified as moderate semi-arid. Climate averages for this area are presented in **Table 3**.

Table 3. Climate in the vicinity of Schriever Air Force Base, Colorado.

Parameter	Averaging Period	Value
Daily Temperature	January	30°F
	July	71°F
	Annual	50°F
Rainfall	Annual	16 inches
Snowfall	Annual	40 inches
Relative Humidity	Annual - Morning	63%
	Annual - Afternoon	40%
Potential Evaporation	Annual	25 inches
Wind Speed	January	9.4 mph
	July	9.0 mph
	Annual	10.0 mph
Wind Direction (prevailing)	January	North
	July	North
	Annual	North

Source: Western Regional Climatic Center and the National Climatic Data Center for the city of Colorado Springs, CO.

Note: Approximately half of the annual rainfall occurs with afternoon thunderstorms during the months of May through August.

3.2.1.3 Air Quality Regulations and Ambient Air Quality Standards

Air Quality Regulations. The Federal CAA is the primary regulatory authority used by the Colorado Department of Public Health and Environment (CDPHE) to protect the state's air quality. In addition to the CAA, state law grants broad authority to the agency to protect the quality of air in Colorado. Under the CAA, the USEPA regulates six common air pollutants referred to as criteria pollutants. The criteria pollutants are carbon monoxide (CO), lead (Pb), sulfur dioxide (SO_2), nitrogen oxide (NOx), ozone (O_3), and particulate matter (PM). Criteria pollutants are considered harmful to public health, the environment, and property. The term "criteria" air pollutants is used because these are regulated through human health and environmental-based criteria which set permissible levels (or concentrations) in the air. The set levels are called ambient air quality standards and are used to define acceptable upper concentration limits. Of the criteria pollutants, PM and ground-level O_3 are responsible for the most widespread health threats in the United States. In addition to the criteria pollutants, regulations for a number of toxic air pollutants, also referred to as hazardous air pollutants (HAPs), have been established under the CAA Amendments of 1990 for the purpose of reducing the release of these pollutants into the environment. HAPs are known or suspected to cause cancer or other serious health effects.

Federal and state air quality regulations have been established to identify acceptable air quality levels and to manage air emissions associated with stationary and mobile emission sources.

National Ambient Air Quality Standards. The ambient air quality is a measure of the type and amount of pollutants in the atmosphere. For a given region, the air quality is characterized in terms of whether or not it complies with the National Ambient Air Quality Standards (NAAQS) which are listed under Federal regulation 40 CFR 50 and have been adopted by the CDPHE. The NAAQS define the maximum

allowable concentrations of certain pollutants (called criteria pollutants) within a given time period. The USEPA is tasked with constantly reviewing the NAAQS and recommending changes based on improved scientific knowledge and understanding of how these pollutants impact health and the environment. For this reason, there have been a number of changes to the NAAQS in recent years, generally resulting in more stringent air quality requirements. The current NAAQS are presented below in **Table 4**. Note that particulate matter is divided into two categories, PM with a diameter of 10 microns or less (PM_{10}) and PM with a diameter of 2.5 microns or less ($PM_{2.5}$).

Table 4. National Ambient Air Quality Standards.

Pollutant		Averaging Period	NAAQS
Carbon Monoxide	(CO)	1-hour 8-hour	35 ppm 9 ppm
Lead	(Pb)	3-month rolling Calendar quarter (90 day)	0.15 µg/m^3 1.5 µg/m^3
Nitrogen Dioxide	(NO_2)	Annual	100 ppb
Particulate Matter	(PM_{10}) ≤ 10 microns in diameter	24-hour	150 µg/m^3
Particulate Matter	($PM_{2.5}$) ≤ 2.5 microns in diameter	24-hour Annual	35 µg/m^3 15 µg/m^3
Ozone	(O_3)	8-hour	0.075 ppm
Sulfur Dioxide	(SO_2)	1-hour 24-hour Annual	75 ppb 0.14 ppm 0.03 ppm
NAAQS = National Ambient Air Quality Standards µg/m³ = micrograms per cubic meter		ppm = parts per million ppb =parts per billion	

Individual states are required by the CAA to define air quality regions and monitor the air quality within the state. Areas are then designated by the USEPA as falling into one of four categories with respect to the NAAQS:

- *Attainment*: Areas that are in compliance with the NAAQS,
- *Non-attainment*: Areas where the applicable NAAQS are not being met,
- *Maintenance:* Areas that were previously classified as "non-attainment" but are now in compliance with the NAAQS as a result of a state air quality management plan, or
- *Unclassified*: Areas for which no monitoring data is available and are by default considered to be in attainment of the NAAQS.

Schriever AFB is located in an air quality region (El Paso County, Colorado), which is currently designated as attainment for all NAAQS pollutants with the exception of CO which has been designated as maintenance since 1999 (USEPA, 40 CFR 81). The classification as maintenance for CO indicates that: (1) the USEPA has approved an emissions control strategy for the region, and (2) the strategy has been successful in reducing the CO concentrations below the NAAQS. The state is required to continue

implementing the control strategy until the USEPA replaces the classification of maintenance with a classification of attainment.

3.2.1.4 Air Permitting

As a means of tracking and limiting air pollutant emissions, state and Federal air regulations require any stationary source (i.e., facility) with emissions above certain thresholds of criteria pollutants and/or HAPs to obtain an air permit to legally operate the facility. A facility with the potential to emit less than 100 tons per year of each criteria pollutant, 10 tons per year for each individual HAP, or 25 tons per year of total HAPs is classified as a minor source and would operate under a state-only air permit. A facility with the potential to exceed any of these thresholds is classified as major for Title V, and facility with the potential to emit more than 250 tons per year of any criteria pollutant is classified as major for Prevention of Significant Deterioration (PSD). A facility with the potential to emit as a major source may request federally-enforceable operating and/or emission limits in order to restrict emissions below the major source thresholds. In this case, the facility would be classified as a synthetic minor source.

An air permit contains the conditions or limits under which the facility may operate and emit pollutants into the atmosphere. Mobile sources, such as automobiles and highway trucks, are exempt from air permitting, but emissions from these sources may be managed through local and regional emissions testing programs. All stationary and mobile sources of air pollutants within a region contribute to the overall air quality of that area. Schriever AFB had been operating under Colorado air permit 95EP772 as a minor source for HAPs and a synthetic minor source for criteria pollutants, but has recently submitted an application to operate as a major source for Title V source for the criteria pollutants. The Base would remain a minor source for HAPs.

In addition to the air operating permit program, the CDPHE requires certain sources to submit Air Pollution Emission Notices (APENs) for individual emission units that exceed threshold limits listed under Colorado Code of Regulations 1001, Regulation 3, Part II. Generally, for sources located in attainment areas, an APEN is required for individual emission points with uncontrolled actual emissions of two tons per year or more of any criteria pollutant, or with HAP emissions that exceed de minimis levels defined in Appendix A of this regulation. The HAP de minimis range is from 50 to 5,000 pounds per year depending on the type of HAP, the elevation of the release point above ground level, the distance from the source to the property boundary, and how the emission point is defined (i.e., a single point or a composite of multiple points, see Section II.B.4 of the regulation). Also, an APEN is required for activities involving disturbance of surface areas for purpose of land development that do not exceed 25 contiguous acres and that do not exceed 6 months in duration.

The proposed projects at Schriever AFB would involve construction and ground disturbing activities that generate particulate matter (PM_{10} and $PM_{2.5}$) as fugitive dust. For any construction project that exceeds the 25 acre/6-month duration threshold, an APEN would be required along with specific measures to control the fugitive dust to the extent technically feasible and economically reasonable. Control measures would apply to on-site unpaved roads (watering, chemical stabilizers, limiting vehicle speeds, or gravelling), controlling dust from disturbed areas (watering, chemical stabilizers, limiting vehicle speeds, revegetation, furrows, wind breaks, temporary compaction, or synthetic or natural covering, such as netting or mulching), and preventing mud and dirt from being carried out onto paved roads (gravel entryways, washing vehicle wheels, or street cleaning).

3.2.1.5 General Conformity Rule

Air conformity is defined as upholding air quality goals by eliminating or reducing violations of the NAAQS and achieving attainment of these standards. It applies to federally funded actions that generate air pollutant emissions. Actions are to be reviewed to ensure that they would not cause or contribute to new violations, increase the frequency or severity of existing violations, delay attainment, or delay planned regional emission reductions. Review is only required by the rule in areas designated as nonattainment or maintenance for a NAAQS, and only for the affected pollutants and precursor pollutants. For El Paso County, which is currently a NAAQS maintenance area for CO, this review is applicable to proposed emissions of CO only. The General Conformity Rule (also referred to as the Air Conformity Rule) was established under the CAA Title I Section 176 and is regulated under 40 CFR 51 Subpart W and 40 CFR 93.

An Air Conformity Review is an evaluation process in which the environmental, economic, and social aspects of air quality planning are considered in regard to a proposed action. The rule divides the air conformity process into two distinct areas: applicability and determination. For the applicability portion of the analysis, Federal agencies must first assess if an action is subject to the Rule (Applicability Analysis) and, if so, assess whether the action conforms to an applicable state implementation plan (Conformity Determination). The applicability analysis is generally accomplished with an emission analysis for the action. If affected pollutants would be generated above de minimis threshold rates specified in 40 CFR 93.153(b)(1) and (b)(2), then a conformity determination is required. The CO emission threshold for an action in the El Paso County maintenance area is 100 tons per year.

It should be noted that Air Force guidance on air conformity (USAF 2003c), based on the rule as written at that time (i.e., 2003), indicates that in addition to comparing an action's emissions to the de minimis threshold rates, it must also be tested for regional significance. However, in an April 5, 2010 revision to the General Conformity Rule, the USEPA deleted the "regionally significant" test that was included in 40 CFR 93.153(i), based on its finding that the test had been a burden to some Federal agencies with little or no environmental benefit (USEPA 2010). "Regionally significant" had been defined as "a federal action for which the direct and indirect emissions of any pollutant represent 10 percent or more of a nonattainment or maintenance area's emissions inventory."

3.2.1.6 Greenhouse Gases

GHGs refer to gases that are present in the atmosphere and have the ability and tendency to affect the earth's atmospheric temperature through physical processes involving light and thermal energy. GHGs exist in the atmosphere as a result of both natural processes and human activity. The most abundant GHGs associated with (human activities) are CO_2, methane (CH_4), and NOx. These are mainly a byproduct of gasoline, diesel, oil, coal, natural gas, and wood combustion. Although GHGs are not currently regulated under the CAA, the USEPA has recently focused on these emissions from human activity in regard to climate change.

The CEQ, which serves to coordinate Federal environmental efforts and develop environmental policies and initiatives, recently issued draft guidance (CEQ 2010) regarding GHG emissions and the NEPA process. Specifically, the guidance is intended to assist Federal agencies and decision-makers in evaluating or describing the environmental effects of GHG emissions from proposed Federal actions. The guidance advises the agencies preparing a NEPA document to consider whether decision-makers would

benefit from the inclusion of an analysis of GHG emissions and climate change issues relating to the proposed action. Specifically, if the proposed action is anticipated to have direct emissions of 25,000 metric tons or more of CO_2-equivalent GHG emissions on an annual basis, the Federal agency should consider this as an indicator that a quantitative and qualitative assessment may be meaningful to decision-makers and the public (CEQ 2010).

3.2.1.7 Regional Air Quality

NAAQS Status. El Paso County lies within the San Isabel Intrastate Air Quality Control Region (AQCR) 40 CFR 81.175, which includes a total of 10 counties in the State of Colorado. As mentioned above, El Paso County is currently designated as attainment for all NAAQS pollutants with the exception of CO, which has been designated as maintenance since 1999 (USEPA, 40 CFR 81). Ambient monitoring data for the years 1999-2008 has demonstrated that the county has been able to attain the CO NAAQS for this entire period.

As part of the process for official redesignation as CO attainment, El Paso County is under a "limited maintenance plan" that was last revised in 2009 and extended through year 2020 (CDPHE 2009). Under the revised plan, the county must continue to demonstrate compliance with the CO standard at a level of 85 percent or less of the CO NAAQS. Also, under this plan revision, the motor vehicle emission budget of 531 tons of CO per day is no longer applicable beginning in 2011, and there is no longer a requirement to track other source category (e.g., construction, non-road, or point source) emission budgets.

Regional Air Emissions. Regional air emission levels are shown in **Table 5** for each county within the San Isabel Intrastate AQCR along with the total for the region. The data shown in this table is the most recent available from the CDPHE.

Table 5. Regional emissions for year 2008 (ton/year).

County	CO	NOx	PM_{10}	$PM_{2.5}$	SO_2	VOC	HAPs	GHGs
Chaffee County	9,521	827	1,852	NR	24	12,044	39	NR
Custer County	3,531	370	770	NR	2	12,896	10	NR
El Paso County	128,468	24,875	27,744	NR	12,712	36,314	524	NR
Fremont County	12,446	4,927	3,509	NR	1,610	15,093	40	NR
Huerfano County	7,858	1,803	1,540	NR	43	17,386	22	NR
Lake County	3,692	345	635	NR	10	6,386	16	NR
Las Animas County	41,917	8,233	6,191	NR	297	44,435	128	NR
Park County	9,969	920	2,252	NR	23	13,788	41	NR
Pueblo County	40,263	12,836	12,699	NR	11,061	26,526	134	NR
Teller County	9,042	1,132	2,596	NR	73	13,541	32	NR
Total for San Isabel Intrastate AQCR	266,707	56,268	59,788	NR	25,855	198,409	986	NR

AQCR = Air Quality Control Region
CO = carbon monoxide
GHG = greenhouse gases
HAP = hazardous air pollutants
NOx = nitrogen oxides
NR = Not reported
PM_{10} = particulate matter less than or equal to 10 micrometers
$PM_{2.5}$ = particulate matter less than or equal to 2.5 micrometer
SO_2 = sulfur dioxide
VOC = volatile organic compounds
(A) Regional emissions for El Paso County were obtained from the CDPHE emissions inventory website http://www.colorado.gov/airquality/inv_maps_2008.aspx.
(B) HAPs is represented as Benzene in this table, the only HAP listed in the CDHPE emissions inventory website.

3.2.1.8 Schriever AFB Air Emissions

The primary sources of air emissions at Schriever AFB area are power plants, emergency generators, fuel dispensing facilities, and maintenance activities. Although the base recently submitted an air permit application to CDPHE to be reclassified as a Title V major source for criteria pollutants (i.e., potential to emit more than 100 tons per year of any criteria pollutant), it actually operates at levels much less than this. Also, Schriever AFB continues to operate as a minor source for HAPs. This is shown in **Table 6,** which shows the actual emissions from Schriever AFB's recently completed Air Emissions Inventory for calendar year 2009 (USAF 2009).

A comparison between the Schriever AFB and the regional emissions is presented in **Table 7** which shows that Schriever AFB accounts for 0.13 percent or less of total El Paso County emissions and 0.07 percent or less of the San Isabel Intrastate AQCR emissions.

Table 6. Schriever Air Force Base actual emissions for year 2009 (ton/yr).

Emission Source Category	CO	NOx	PM_{10}	$PM_{2.5}$	SO_2	VOC	HAPs	GHGs
External Combustion Sources	7.47	8.90	0.68	0.68	0.05	0.49	0.17	8,484
Fire Fighter Training	0.003	0.11	0.002	0.002	-	0.005	0.00014	3
Fuel Spills	-	-	-	-	-	-	-	-
Fuel Storage	-	-	-	-	-	1.78	0.13	-
Gasoline Service Stations	-	-	-	-	-	3.62	0.31	-
Internal Combustion Engines	2.57	6.69	0.14	0.14	0.04	0.26	0.034	17
Miscellaneous Chemical Use	-	-	-	-	-	0.11	0.021	-
Pesticide Application	-	-	-	-	-	0.17	-	-
Solvent Cleaning Tanks	-	-	-	-	-	0	-	-
Welding	-	-	0.03	0.03	-	-	0.00081	-
Wet Cooling Towers	-	-	1.83	1.83	-	-	-	-
Woodworking	-	-	0.005	0.005	-	-	-	-
Total Base-wide Emissions	10.04	15.70	2.69	2.69	0.09	6.43	0.66	8,503

CO = carbon monoxide
GHG = greenhouse gases
HAP = hazardous air pollutants
NOx = nitrogen oxides
PM_{10} = particulate matter less than or equal to 10 micrometers
$PM_{2.5}$ = particulate matter less than or equal to 2.5 micrometer
SO_2 = sulfur dioxide
VOC = volatile organic compounds

Table 7. Comparison of Schriever Air Force Base and regional emissions.

Comparison	CO	NOx	PM_{10}	$PM_{2.5}$	SO_2	VOC	HAPs	GHGs
Annual Emissions (ton/year)								
Schriever AFB	10.04	15.70	2.69	2.69	0.09	6.43	0.66	8,503
El Paso County	128,468	24,875	27,744	NR	12,712	36,314	524	NR
San Isabel Intrastate AQCR	266,707	56,268	59,788	NR	25,855	198,409	986	NR

Table 7. (continued).

Comparison	CO	NOx	PM_{10}	$PM_{2.5}$	SO_2	VOC	HAPs	GHGs
Schriever AFB Percent Contribution to Regional Emissions (%)								
Percent of El Paso County	0.008%	0.06%	0.010%	-	0.0007%	0.02%	0.13%	-
Percent of San Isabel Intrastate AQCR	0.004%	0.03%	0.004%	-	0.0003%	0.003%	0.07%	-

AQCR = Air Quality Control Region
CO = carbon monoxide
GHG = greenhouse gases
HAP = hazardous air pollutants
NOx = nitrogen oxides
NR = Not reported
PM_{10} = particulate matter less than or equal to 10 micrometers
$PM_{2.5}$ = particulate matter less than or equal to 2.5 micrometer
SO_2 = sulfur dioxide
VOC = volatile organic compounds
Since Schriever AFB and Regional emissions are for different years (i.e., 2009 vs. 2008), the percent contributions are approximate. The comparison using these different years is valid since regional emissions do not vary significantly between years.

Another source of intermittent air emissions at Schriever AFB is prescribed burning. This is used in some areas of the Base to enhance habitat for native short grass prairie species of plants and animals, to reduce invasive weed species, and to maintain short grass cover for security specifications. It generally occurs for a few hours per year and at a rate of approximately 1,000 acres over a 10-year period. Drought conditions, burn bans, or other factors affect the timing and frequency of the burns. Emissions generated during each prescribed burning event include CO, NOx, PM, volatile organic compounds (VOCs), and CO_2. These emissions were not included in the 2009 air emissions inventory or this environmental assessment since these are not part of the proposed actions, and since the short duration and low fuel loading of each burn does not result in a significant contribution to the total Schriever AFB emissions.

3.2.2 Human Health and Safety

3.2.2.1 Definition of the Resource

A safe environment is one in which there is no, or an optimally reduced, potential for death, serious bodily injury or illness, or property damage. Human health and safety addresses workers' health and safety during construction activities as well as public health and safety during and following construction. Construction site safety requires adherence to regulatory requirements imposed for the benefit of the workers. It includes implementation of engineering and administrative practices that aim to reduce risks of illness, injury, death, and property damage.

Health and safety hazards can often be identified and reduced or eliminated. Necessary elements for an accident-prone situation or environment include the presence of the hazard itself together with the

exposed (and possibly susceptible) population. The degree of exposure depends primarily on the proximity of the hazard to the population.

3.2.2.2 Requirements

The health and safety of onsite military and civilian workers are safeguarded by numerous DoD and military-branch specific regulations designed to comply with standards issued by the Federal Occupational Safety and Health Administration (OSHA), USEPA, and state occupational safety and health agencies. These standards specify health and safety requirements, the amount and type of training required for workers, the use of personal protective equipment (PPE), administrative controls, engineering controls, and permissible exposure limits for workplace stressors.

3.2.2.3 Existing Conditions

Contractor safety, military personnel safety, public safety, and explosives and munitions safety are discussed below.

Contractor Safety. All contractors performing construction activities are responsible for following Federal regulations and are required to conduct construction activities in a manner that does not increase risk to workers or the public. Colorado does not administer its own occupational safety and health program; therefore, construction activities must conform to the provisions of the Federal Occupational Safety and Health Act of 1970.

Occupational safety and health programs address exposure to hazardous and toxic substances, safety hazards, use of PPE, and use and availability of Material Safety Data Sheets. Occupational health and safety is the responsibility of each employer, as applicable. Employer responsibilities are to review potentially hazardous workplaces; monitor exposure to workplace chemical (e.g., asbestos, lead, hazardous substances), physical (e.g., noise propagation, falls), and biological (e.g., infectious waste, wildlife, poisonous plants) agents; recommend and evaluate controls (e.g., prevention, administrative, engineering, PPE) to ensure exposure to personnel is eliminated or adequately controlled; and ensure a medical surveillance program is in place to perform occupational health physicals for those workers subject to the use of respiratory protection, engaged in hazardous waste work, asbestos, lead, or other work requiring medical monitoring.

Military Personnel Safety. All USAF personnel are protected from occupational hazards by AFI 91-301, *Air Force Occupational and Environmental Safety, Fire Protection, and Health* Program, which implements AFPD 91-3, *Occupational Safety and Health*. The purpose of the Air Force Occupational and Environmental Safety, Fire Protection, and Health Program, as stated in AFI 91-301, is to "minimize the loss of USAF resources and to protect USAF personnel from occupational deaths, injuries, or illnesses by managing risks" (USAF 1996).

Public Safety. Schriever AFB has its own emergency services department. Schriever AFB's Fire Emergency Services is outfitted to provide fire suppression, crash-response, emergency medical, and hazardous substance protection. A two-bay fire station is located on the installation, which supports two fire engines, one rescue vehicle, two command vehicles, one hazardous materials (HAZMAT) vehicle, and one HAZMAT decontamination trailer. Fire Emergency Services also has mutual aid agreements with the El Paso County, Colorado Springs, Falcon, and Ellicott fire protection districts. Fire Emergency

Services also trains and responds to HAZMAT/chemical, biological, radiological, nuclear, and high yield explosive events, confined space rescue, and wildland fire. Fire Emergency Service staff also support the contract ambulance service during medical responses (SAFB 2009a).

The 50 SFS Squadron provides police protection for the more than 6,000 civilian and military personnel assigned to Schriever AFB (SAFB 2009b). The El Paso County Sheriff's Office provides additional police support. The 21 Space Wing Medical Group provides medical care at the medical clinic on Schriever AFB (SAFB 2009a). Additional medical facilities, including Memorial Hospital and Penrose Community Hospital, are located in the City of Colorado Springs.

3.2.3 Noise

3.2.3.1 Definition of the Resource

Noise is defined as any unwanted sound that interferes with normal activities, is intense enough to damage hearing, or in some way reduces the quality of the environment. Noise can be intermittent or continuous, steady or impulsive, and can involve any number of sources and frequencies. It can be readily identifiable or generally nondescript. Human response to increased sound levels varies according to the source type, characteristics of the sound source, distance between source and receptor, receptor sensitivity, and time of day. How an individual responds to the sound source determines whether the sound is viewed as a pleasant or annoying noise. Affected receptors can be specific (e.g., schools, churches, or hospitals) or broadly defined (e.g., nature preserves or designated districts) areas in which occasional or persistent sensitivity to noise above ambient levels exists.

A decibel (dB) is the physical unit commonly used to describe instantaneous sound levels. Sound measurement is further refined by using an "A-weighted" decibel (dBA) scale, which emphasizes the audio frequency response curve audible to the human ear. Thus, the dBA measurement more closely describes how a person perceives sound. Human response to increased sound levels varies according to the source type, characteristics of the sound source, distance between source and receptor, receptor sensitivity, and time of day.

Sound levels, resulting from multiple single events, are used to characterize community noise effects from aircraft or vehicle activity and can be measured in day-night average sound level (DNL). The DNL noise metric incorporates a "penalty" for evening and nighttime noise events to account for increased annoyance. DNL is the energy-averaged sound level measured over a 24-hour period, with a 10-dBA penalty assigned to noise events occurring between 10:00 p.m. and 7:00 a.m. DNL values are obtained by averaging single event values for a given 24-hour period. DNL is the preferred sound level metric used to characterize noise impacts of the Federal Aviation Administration (FAA), U.S. Department of Housing and Urban Development (HUD), USEPA, and DoD for modeling airport environments. Most people are exposed to DNL sound levels of 50 to 55 dBA or higher on a daily basis.

Peak sound level is another metric used to assess elevated noise levels. Generally, peak sound levels of 115-130 dBA represent a moderate risk for complaint, while a peak level above 130 represents a high risk for complaint (Finegold et al. 1994; U.S. Army 2010).

The ambient acoustic environment refers to the outdoor noise levels within a given area. Ambient noise levels vary greatly in magnitude and character from one location to another, depending on the normal activities conducted in the area. Based on a review of ambient noise levels measured in rural settings with high quality wind resources, typical noise levels range from 30 dBA to 60 dBA on an hourly

equivalent continuous noise level (Leq) basis[3]. Studies specifically conducted to determine noise effects on various human activities show that about 90 percent of the population is not significantly bothered by outdoor sound levels below 65 dBA (FICON 1992).

3.2.3.2 Requirements

The OSHA standard for permissible noise exposure is 90 Leq (8), averaged over eight hours. According to the USAF, the FAA, and the HUD criteria, residential units and other noise-sensitive land uses are "clearly unacceptable" in areas where the noise exposure exceeds a DNL of 75 dBA, "normally unacceptable" in regions exposed to noise between 65 dBA and 75 dBA, and "normally acceptable" in areas exposed to noise of 65 dBA or under. The Federal Interagency Committee on Noise developed land use compatibility guidelines for noise in terms of DNL noise levels (FICON 1992). For outdoor activities, the USEPA recommends a DNL sound level of 55 dBA as the sound level below which there is no reason to suspect that the general population would be at risk from any of the effects of noise (USEPA 1974).

3.2.3.3 Existing Condition

Sensitive noise receptors at Schriever AFB include a Child Development Center and a medical clinic, both located within the Community Center ADP, and the residential development located immediately east of the Community Center ADP. There are no other sensitive noise receptors in the vicinity of the proposed project area. Existing ambient noise levels at Schriever AFB are generally low, and are dominated primarily by vehicle traffic on Base and from Highway 94 (located approximately 1.5 miles north of the installation), with occasional noises from agricultural operations, small aircraft, aircraft from nearby Peterson AFB, weather disturbances, and natural sources (e.g., local fauna, wind).

3.2.4 Land Use and Visual Resources

3.2.4.1 Definition of the Resource

3.2.4.1.1 Land Use

The term "land use" refers to real property classifications that indicate either natural conditions or the types of human activity occurring on a parcel. In many cases, land use descriptions are codified in local zoning laws. However, there is no nationally recognized convention or uniform terminology for describing land use categories. As a result, the meanings of various land use descriptions, "labels," and definitions vary among jurisdictions. Natural conditions of property can be described or categorized as unimproved, undeveloped, conservation or preservation area, and natural or scenic area. Land use categories used for planning purposes at Schriever AFB include administrative, community (commercial), community (service), industrial, medical, open space, operations/maintenance, and outdoor recreation.

3.2.4.1.2 Visual Resources

Visual resources include the natural and man-made physical features that give a particular landscape its character. The features that form the overall visual impression a viewer receives include landforms, vegetation, water, color, adjacent scenery, scarcity, and man-made modifications. These features define the landscape character of an area and form the overall impression that an observer receives of that area.

[3] L_{eq} is the average sound level over a period of measurement.

Evaluating the aesthetic qualities of an area is a subjective process because the value that an observer places on a specific feature varies depending on their perspective. In general, a feature observed within a landscape can be considered as "characteristic" (or character-defining) if it is inherent to the composition and function of the landscape. Landscapes can change over time, so the assessment of the environmental impacts of a proposed action on a given landscape or area must be made relative to the "characteristic" features currently composing the landscape or area.

3.2.4.2 Requirements

Two main objectives of land use planning are to ensure orderly growth and compatible uses among adjacent property parcels or areas. According to Air Force Pamphlet 32-1010, *Land Use Planning*, land use planning is the arrangement of compatible activities in the most functionally effective and efficient manner possible (USAF 1998). Compatibility among land uses fosters the societal interest of obtaining the highest and best uses of real property. Tools supporting land use planning within the civilian sector include written master plans or management plans, policies, and zoning regulations. The USAF comprehensive planning process also utilizes functional analysis, which determines the degree of connectivity among installation land uses and between installation and off-installation land uses, to determine future installation development and facilities planning.

In appropriate cases, the location and extent of a proposed action needs to be evaluated for its potential effects on a project site and adjacent land uses. The foremost factor affecting a proposed action in terms of land use is its compliance with any applicable land use or zoning regulations. Other relevant factors include matters such as existing land use at the project site, the types of land uses on adjacent properties and their proximity to a proposed action, the duration of a proposed activity, and its "permanence."

3.2.4.3 Existing Conditions

Off-Installation Land Use. Schriever AFB is located on 3,840 acres in central El Paso County, Colorado. It is approximately 8 miles east of Peterson AFB and approximately 10 miles east of Colorado Springs, Colorado. The entire region surrounding Schriever AFB is designated in the El Paso County Master Plan as RR-5 (Rural Residential) (EPCPD 2009a). This zoning designation provides primarily for low-density rural single family residential development with a minimum lot size requirement of 5 acres (EPCPD 2009b).

A mixture of state-owned and private lands surrounds Schriever AFB. Although designated for rural residential use in the El Paso County Master Plan, both the surrounding public and private lands are used primarily for agricultural purposes. Given this current land use and zoning, limited constraints exist on future development at, or expansion of, Schriever AFB. However, a 3,000-unit housing area, shopping center, and business park development is planned for the area immediately north of the installation.

On-Installation Land Use. The land at Schriever AFB is owned entirely by the USAF. Of the 3,840 acres at Schriever AFB, 640 acres are currently developed for mission use. The National Reconnaissance Office and the Missile Defense Agency are associate organizations that occupy building space on-installation. Land use classifications at Schriever AFB include Administrative, Community (Commercial), Community (Service), Industrial, Medical, Open Space, Operations/Maintenance, and Outdoor Recreation. Developable land exists both inside and outside the RA. The availability and accessibility of utilities is both the driving force and limiting factor with regards to development.

The most heavily developed area at Schriever AFB is the RA in the central portion of the installation. The 2009 Schriever AFB General Plan (SAFB 2009a) includes the recommendation that development within the RA be for new classified mission facilities and that existing support facilities and non-mission functions be moved outside the RA. The current land use designations within the RA include Mission Operations, Maintenance, Administrative, Community (Service), and Open Space. Facilities associated with these land use designations within the RA include the National Reconnaissance Office building, the Missile Defense Agency building, the main operations building, the Colorado Tracking Station facilities, the Defense Satellite Communications System, the installation support facility, the central heat and power plant, a fire station, warehouses, and the engineering and administration facility. Though an area within the RA is designated for Community (Service), there are currently no facilities dedicated to community service within the RA. Much of the Open Space within the RA is part of the buffer zone required near the security fence. Other Open Space is being reserved for future mission growth within the RA (SAFB 2009a).

Development has historically been limited outside of the RA. Open Space, which encompasses approximately 3,000 acres, is the predominant land use designation outside the RA (SAFB 2009a). Additional land use designations outside the RA include Administrative, Community (Commercial), Community (Service), Industrial, Medical, Operations/Maintenance, and Outdoor Recreation. Facilities associated with these land use designations outside the RA include the pass and registration building, the security forces facility, west entry control, wing headquarters, Federal credit union, an Army and Air Force Exchange Services (AAFES) gas station, the installation fitness center, the Medical/Dental Facility, and athletic facilities. Schriever AFB recently completed a 242-unit privatized family housing complex in the north-central portion of the installation.

Future Land Use. According to the General Plan, Schriever AFB is expected to grow from its current percentage of developed land (25 percent) to 59 percent over the next 20 years. This development could be constrained by several factors, including environmental constraints, the fact that the installation is currently five percent over its space utilization, the need to preserve look angles for satellite antennas, and the threat of encroaching development outside of the installation. However, due to the abundance of open space currently available on the installation, these constraints are not expected to prevent future development (SAFB 2009a).

A number of changes to current land uses are recommended in the 2009 General Plan for Schriever AFB. These future land use recommendations include the following:

- New classified mission facilities would be constructed within the RA;
- Support facilities would be sited outside of the RA;
- Non-mission related functions currently located within the RA would gradually transition to outside the RA as facilities become available;
- Selected emergency utility functions (i.e., power and heating, ventilation, and air conditioning [HVAC]) would remain inside the RA for added protection; and
- In the near term, a growing need exists for additional community support services to serve installation personnel, and land would be required for these facilities.

Visual Resources. A mixture of open space and military facilities dominates the current visual environment at Schriever AFB. The military facilities are most prominent within the RA and include satellite domes, warehouses, and office buildings. A military family housing area is situated in the north-central portion of the installation. Off-installation, the visual environment is dominated by agricultural rangeland and open space on all sides. Although a new off-installation residential and business development is planned on the north side of the installation, construction has not yet begun, and the area retains its current rural, largely undeveloped character.

3.2.5 Geologic Resources

Geologic resources discussed in this section include geology, topography, and soils.

3.2.5.1 Definition of the Resource

Geologic resources are limited, nonrenewable earth resources whose characteristics can easily be degraded by physical disturbances.

3.2.5.2 Requirements

Prime farmland is protected under the Farmland Protection Policy Act (FPPA) of 1981. Prime farmland is defined as land that (1) has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and (2) is also available for these uses. The land could be cropland, pasture, rangeland, or other land, but not urban built-up land or water. The intent of the FPPA is to minimize the extent that Federal programs contribute to the unnecessary conversion of farmland to nonagricultural uses. The Act also ensures that Federal programs are administered in a manner that, to the extent practicable, will be compatible with private, state, and local government programs and policies to protect farmland. The FPPA applies to all projects that require new rights-of-way and that are planned for Federal funding; however, lands that are used for national defense purposes are exempt from the provisions of the FPPA (7 CFR Parts 657 and 658).

3.2.5.3 Existing Condition

The existing condition of geologic resources including subsurface geology, topography and soils, is described below.

Geology. Schriever AFB is situated on the western edge of the Denver Basin geologic formation. The underlying sediments consist of unconsolidated deposits eroded from the Rocky Mountains. The area is composed of sandy foothills and plains of low relief, and is identified as the high plains of the Colorado Piedmont of the Great Plains Physiographic Province. The region is characterized by rolling grasslands that terminate at the eastern edge of the central Rocky Mountains. The Colorado Piedmont is a mature elevated plain, dissected by numerous streams. In the local area, this includes Chico and Black Squirrel Creeks and their tributaries.

The Base is underlain by about 25 to 100 feet of Quaternary alluvium (primarily sand and gravel) from tributaries of the Arkansas River (EPCPD 2003). These deposits are underlain by the Arapahoe Formation, which consists of a 200-foot thick sequence of interbedded conglomerate, sandstone, siltstone, and shale. The deposits of the Laramie and Fox Hills Formations underlie the Arapahoe Formation. The Laramie Formation (500- to 600-feet thick) is composed of sandstone and shale. The sandstone is fine to

medium texture, friable, and carbonaceous. The Fox Hills Formation, about 100-feet thick, consists of sandstone and siltstone interbedded with shale. Pierre Shale underlies the Laramie-Fox Hills Formation (U.S. Geological Survey [USGS] 1984). Mineral resources are not known to exist in the area (EDAW 1992).

Geologic hazards, such as landslides or active faults, are not known to exist in the vicinity of the Base. The nearest major faults are located about 75 to 100 miles from Schriever AFB (USGS 2002; USGS 2004); therefore, there is low to nonexistent risk of major damage from mass ground movement or seismic activity.

The USGS calculates the probability of potential ground motion from faults and earthquake events in an area, compared to the motion of an object falling due to gravity. At Schriever AFB, there is a 10 percent chance that a peak acceleration of 3.5 percent of gravity would be exceeded in 50 years (USGS 2004). This would approximately equal a value of V to VI on the Modified Mercalli Scale for earthquake intensity. Earthquakes of this magnitude would typically cause breakage of windows or plaster or other slight damage. On average, this would equal magnitudes in the range of 4.0 to 4.4 on the Richter Scale (this is variable depending on the proximity of the earthquake to the site). Since 1973, there have been 10 earthquakes within 62 miles of the Base, with magnitudes ranging from 2.2 to 4.0 (USGS 2005; USGS 2006a).

Topography. The topography at Schriever AFB consists of gently sloping plains to rolling hills, dissected by stream channels. Several depressions are scattered throughout the northwest, southwest, north central and south central areas of the Base. Elevations range from about 6,380 feet above mean sea level (msl) near the northwest corner of the Base to about 6,095 feet at the southeast corner of the Base. Slopes are generally to the south and southeast (USAF 2005a). The most important topographic factor influencing base development is slope greater than 10 percent. Undisturbed, naturally occurring areas of more than 10-percent slope are a constraint to facility development and are subject to severe soil erosion. Only small areas along a few drainages on the base have slopes steeper than 10 percent.

RA. A gently sloping plain dissected by several stream channels characterizes topography within the RA. Elevations range from approximately 6,290 to 6,220 feet above msl. Slopes are generally to the southeast at 4 to 6 percent, with the exception of two stream channels where slope orientation is variable and slope angles are steeper.

South of RA. Topography varies from gently to moderately sloping hills (2 to 6 percent slope) to steep slopes near drainage ways (up to 20 percent slope). Elevations range from about 6,245 to 6,200 feet above msl. Slopes are generally to the southeast and east, but vary near drainage ways.

West of RA (including the West Campus ADP). The land generally slopes to the south and southeast at slopes of 2 to 6 percent. An ephemeral stream has cut a small drainage way at the southern end of this area, with somewhat steeper slopes near Enoch Road south of Irwin Avenue. Elevations are between 6,350 and 6,250 feet above msl.

North and Northwest of RA (including the Community Center ADP). The topography in this area consists of gently to moderately sloping hills (slopes of 2 to 6 percent toward the east and southeast). A drainage way has cut a channel near the eastern end of this area, where slopes are between 10 and 20

percent. Elevations range from 6,380 feet above msl near the northwest corner of the Base to about 6,265 feet above msl near the drainage way north of the RA.

Northeast of the RA. Slopes are generally to the east and southeast at 1 to 6 percent in this area of uplands and rolling hills. Elevations range from 6,340 feet above msl in the north central part of the Base to 6,165 feet above msl near the northeast corner of the Base.

Soils. Soils at Schriever AFB are situated on level to moderately undulating slopes formed in arkosic (derived from quartz and feldspar-rich granite) sedimentary rocks derived from aeolian (windblown) and alluvial (water deposited) sediment. The following paragraphs describe the soils at the Base that could potentially be affected by the Proposed Action.

Nine soil types occur at Schriever AFB (Natural Resources Conservation Service [NRCS] 2009). These soil types consist primarily of sandy loam, loamy sand, and silt loam textures. All are well drained to somewhat excessively drained with the depth to the water table (the upper limit where the soil or rock material is saturated with water) 6 feet or greater. The Ascalon sandy loam is the predominant soil type, covering the southwestern two-thirds of the property. The Bresser sandy loam is the second most abundant soil type, covering the majority of the northeastern one-third of the property.

The sandy loam soils (Ascalon, Blendon, and Bresser) have a moderate infiltration rate, moderate permeability, and moderate water-holding capacity. Surface runoff is slow, and hazards of erosion and soil blowing are moderate. The loamy sand soils (Blakeland, Ellicott, Sampson, and Truckton) have rapid infiltration rate, low to moderate permeability, and low to moderate waterholding capacity. Surface runoff is slow, and the hazard of erosion is moderate to high, and soil blowing is moderate to severe. The Keith silt loam has moderate permeability, and a high water-holding capacity. Surface runoff is slow and the erosion hazard is moderate. All of the soils have an effective rooting depth of 60 inches or more. Further descriptions of individual soil types are given in the General Plan (SAFB 2009a).

Table 8 summarizes the physical properties of these soils. Additional information on soil properties and ratings for various uses is summarized in the Schriever AFB Integrated Natural Resources Management Plan (INRMP; USAF 2008). In general, the soils have slight to moderate constraint for building sites. The Ellicott loamy coarse sand located in an intermittent drainage south of the RA, is subject to flooding, and is therefore classified as having severe constraints for building development. The Samson silt loam is located southeast of the restricted zone near the center of the property and is classified as having a moderate constraint for building development due to frost action.

Current uses of the soils in undeveloped areas include wildlife habitat and urban forestry. In the past, rangeland also was supported. During years of decreased or increased soil moisture, the amount of forage produced had the potential to decrease or increase by as much as 50 percent. While the soils are well suited to production of grass, active management is required to prevent overgrazing. Due to drought conditions, overgrazing, and installation of the perimeter fence, use of rangeland has ceased. Development of roads, buildings and other facilities at Schriever AFB has resulted in increased impermeable surface area, which increases the potential for erosion and increased stormwater runoff.

Of the nine mapping units within the area of the Proposed Action, four are classified as prime farmland soil if irrigated. However, these soils are not currently irrigated, and therefore would not be considered prime farmland soils as defined by the FPPA.

3.2.6 Water Resources

Water resources analyzed in this EA include groundwater, surface water (including stormwater runoff), floodplains, and wetlands.

3.2.6.1 Definition of the Resource

Groundwater consists of subsurface hydrologic resources. It is an essential resource that functions to recharge surface water and is often used for potable water consumption, agricultural irrigation, and industrial applications. Groundwater typically can be described in terms of its depth from the surface, aquifer or well capacity, water quality, surrounding geologic composition, and recharge rate. It is found in aquifers, pore spaces of rocks, in unconsolidated sediments, and as soil moisture.

Surface waters include streams, rivers, bays, ponds, lakes, and surface water generated from stormwater runoff. Surface water is important for its contributions to the economic, ecological, recreational, and human health of a community or locale. Stormwater is an important component of surface water systems because of its potential to introduce sediments and other contaminants that could degrade surface waters. Proper management of stormwater flows, which can be intensified by high proportions of impervious surfaces associated with buildings, roads, and parking lots, is important to the management of surface water quality and natural flow characteristics. Prolonged increases in stormwater runoff volume and velocity associated with development and increased impervious surfaces has potential to impact adjacent streams as a result of stream bank erosion and channel widening or down cutting associated with the adjustment of the stream to the change in flow characteristics. Stormwater management systems are typically designed to contain runoff onsite during construction and to maintain predevelopment stormwater flow characteristics following development, through either the application of infiltration or retention practices. Failure to size stormwater systems appropriately to hold or delay conveyance of the largest predicted precipitation event often leads to downstream flooding and the environmental and economic damages associated with flooding.

Floodplains are topographically low areas along rivers, stream channels, or coastal waters that are subject to periodic or infrequent inundation due to rain or melting snow. Floodplain ecosystem function to moderate, store and convey floodwaters; recharge groundwater; facilitate nutrient cycling; maintain water quality; and provide habitat for a diversity of plants and animals. Flood potential is evaluated by the Federal Emergency Management Agency (FEMA), which defines the 100-year floodplain as an area within which there is a 1 percent chance of inundation by a flood event in a given year. Risk of flooding is influenced by local topography, the frequency of precipitation events, the size of the watershed above the floodplain, and upstream development. Federal, state, and local regulations often limit floodplain development to passive uses, such as recreational and preservation activities, to reduce the risks to human health and safety. EO 11988, *Floodplain Management*, directs Federal agencies to avoid siting within floodplains unless the agency determines that there is no practicable alternative.

Table 8. Physical properties of soils at Schriever Air Force Base.

Map Symbol	Description	Slope %	Runoff	Wind Erosion	Water Erosions	Prime Farmland[1]	Natural Drainage	Construction Limitations	Acreage	Percentage
2	Ascalon sandy loam	1-3	slow	moderate	moderate	I	well	Moderate: low strength, shrink-swell, frost action	638	16.6
3	Ascalon sandy loam	3-9	slow to medium	moderate	moderate	N	well	Moderate: low strength, shrink-swell, frost action, slope	1,616	42.2
8	Blakeland loamy sand	1-9	slow	severe	slight	N	somewhat excessively drained	Slight to moderate: slope, severe limits for excavation, cave ins	199	5.2
10	Blendon sandy loam	0-3	slow	moderate	slight to moderate	N	well	Slight to moderate: low strength, frost action	42	1.1
11	Bresser sandy loam	0-3	slow	moderate	slight to moderate	I	well	Slight	291	7.6
12	Bresser sandy loam	3-5	slow	moderate	slight to moderate	I	well	Slight	553	14.4
28	Ellicott loamy coarse sand	0-5	slow	severe	slight to moderate	N	somewhat excessively drained	Severe: flooding, cave-ins	29	0.8
39	Keith silt loam	0 -3	medium	slight	moderate	I	well	Moderate: slope	99	2.6
78	Sampson loam	0-3	slow	slight	slight to moderate	I	well	Moderate: low strength, shrink-swell, frost action	44	1.2
95	Truckton loamy sand	1-9	slow	severe	slight to moderate	N	well	Slight: slope	28	0.7
97	Truckton sandy loam	3-9	slow to medium	moderate	moderate	N	well	Slight to moderate: slope, frost action	258	6.7
112	Playas	-	-	-	-	-	-	-	34	0.9
								TOTAL	3,831	100

Source: Natural Resources Conservation Services, 2009. I = farmland soil if irrigated [1] N = not prime farmland soil

Wetlands are defined by the USACE as those areas inundated or saturated by surface or groundwater at a frequency and for a duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. In addition to providing habitat for many plants and animals, wetlands provide flood control and water quality functions in support of ecosystem integrity. The presence of hydrophytic vegetation, hydric soils, and wetland hydrology were used to determine the existence and extent of wetland areas. The overall management objective for this resource, as required by Section 404 of the CWA and the EO on Wetlands (EO 11990), is that there be "no net loss of wetlands."

3.2.6.2 Requirements

Federal regulations that apply to water resources and Schriever AFB site activities include the CWA (33 USC 1251 et seq., as amended), Section 438 of the EISA, and floodplain and wetland environmental review requirements. State regulations include the Colorado Water Quality Control Act. These regulations are described below.

The CWA establishes Federal limits, through the National Pollutant Discharge Elimination System (NPDES), on the amounts of specific pollutants that are discharged to surface waters in order to restore and maintain the chemical, physical, and biological integrity of the water. The NPDES program regulates the discharge of point (end of pipe) and nonpoint sources (stormwater) of water pollution. Section 404 of the CWA regulates the discharge of fill material into waters of the United States, which includes wetlands. Waters of the United States are defined within the CWA, as amended, and jurisdiction is addressed by the USEPA and the USACE. These agencies assert jurisdiction over (1) traditional navigable waters, (2) wetlands adjacent to navigable waters, (3) non-navigable tributaries of traditional navigable waters that are relatively permanent where the tributaries typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months), and (4) wetlands that directly abut such tributaries.

In 2010, the USEPA issued a Final Rule for the CWA concerning technology-based Effluent Limitations Guidelines and New Source Performance Standards for the Construction and Development point source category. All NPDES stormwater permits issued by the USEPA or states must incorporate requirements established in the Final Rule. As of February 1, 2010, all new construction sites that disturb greater than one acre of land are required to meet the non-numeric effluent limitations and effective erosion and sedimentation controls must be designed, installed, and maintained. These include the following:

- Control stormwater volume and velocity to minimize erosion;
- Control stormwater discharges including both peak flow rates and total stormwater volume;
- Minimize the amount of soil exposed during construction activities;
- Minimize the disturbance of steep slopes;
- Minimize sediment discharges from the site using controls that address factors such as the amount, frequency, intensity and duration of precipitation, the nature of resulting stormwater runoff, and soil characteristics, including the range of soil particle sizes expected to be present on the site;

- Provide and maintain natural buffers around surface waters, direct stormwater to vegetated areas to increase sediment removal, and maximize stormwater infiltration where feasible;

- Minimize erosion at outlets and downstream channel and stream bank erosion; and

- Minimize soil compaction and preserve topsoil where feasible.

A Construction General Permit from USEPA Region VIII would be required for any activities disturbing more than one acre of land. The permit outlines provisions construction operators must follow to comply with the requirements of NPDES regulations. Site-specific Stormwater Pollution Prevention Plans (SWPPPs) may need to be developed. A separate NPDES permit is required for each construction project on the base, in accordance with the requirements of Section 402 of the CWA.

Effective August 1, 2011, construction activities disturbing a total of 20 or more acres at one time, including noncontiguous land disturbances that take place at the same time and are part of a larger common plan of development, must comply with the numeric effluent limitation for turbidity in addition to the non-numeric effluent limitations. The maximum daily turbidity limitation is 280 nephelometric turbidity units.

Section 438 of the EISA (42 USC Section 17094) establishes into law new stormwater design requirements for Federal construction projects that disturb a footprint of greater than 5,000 square feet of land. EISA Section 438 requirements are independent of stormwater requirements under the CWA. The project footprint consists of all horizontal hard surfaces and disturbed areas associated with project development. Under these requirements, predevelopment site hydrology must be maintained or restored to the maximum extent technically feasible with respect to temperature, rate, volume, and duration of flow. Predevelopment hydrology shall be modeled or calculated using recognized tools and must include site-specific factors such as soil type, ground cover, and ground slope. Site design shall incorporate stormwater retention and reuse technologies such as bioretention areas, permeable pavements, cisterns/ recycling, and green roofs to the maximum extent technically feasible. Post-construction analyses shall be conducted to evaluate the effectiveness of the as-built stormwater reduction features. As stated in a DoD memorandum dated January 19, 2010, these regulations have been incorporated into applicable DoD Unified Facilities Criteria (DoD 2010). Additional guidance is provided in the USEPA's Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the EISA.

The Colorado Water Quality Control Act [Title 25] establishes provisions for the control and prohibition of air and water pollution within the state. In addition, the CDPHE is responsible for administering the permitting program created under the Act. No stationary installation that is reasonably expected to be a source of water pollution may be operated, maintained, constructed, expanded, or modified without an appropriate permit issued by the department.

AFI 32-7041, *Water Quality Compliance*, instructs the Air Force on how to assess, attain, and sustain compliance with the CWA and Federal, state, and local environmental regulations.

Potential development in designated floodplain areas is subject to the provisions of EO 11988, *Floodplain Management*, which requires Federal agencies to look at all practical alternatives to avoid impacts to floodplains. AFI 32-7064, *Integrated Natural Resource Management*, lists three criteria that must be met

for the USAF to construct in a floodplain: evaluate and document the potential effects of such actions through the environmental impact analysis process; consider alternatives to avoid these effects and incompatible development in the floodplain; and design or modify actions in order to minimize potential harm to or within the floodplain.

Any potential modifications to wetlands are addressed in accordance with EO 11990, *Protection of Wetlands*, which regulates development activities in or near streams. EO 11990 directs Federal agencies to avoid new construction in wetlands unless there is no practicable alternative and unless the proposed action includes all practicable measures to minimize harm to wetlands that might result from such use. AFI 32-7064, Section 3, provides the Air Force with guidance for no net loss of wetlands on Air Force installations.

3.2.6.3 Existing Condition

Current water resources at Schriever AFB are described in the sections that follow. Included are discussions of groundwater, surface water (including stormwater), floodplains, and wetlands.

Groundwater. Schriever AFB is near the southern edge of the Denver Aquifer system (USGS 1984; EPCPD 2003). The aquifer system underlies an area of about 7,000 square miles that extends from Greeley south to near Colorado Springs and from the Front Range east to near Limon. This aquifer system is composed of four aquifers (Dawson, Denver, Arapahoe, and Laramie-Fox Hills) in five geologic formations and is up to 3,000-feet thick. These formations are deepest in the central part of the aquifer, and shallow near the edges, outcropping in concentric circles at the edges of the Denver Basin. At the outer edge of the system lies the Laramie-Fox Hills Aquifer, which underlies Schriever AFB. The Arapahoe Aquifer also underlies Schriever AFB. The Denver Aquifer underlies about 32 acres of the northern edge of Schriever AFB and the Dawson Aquifer is about nine miles to the north (EPCPD 2003; USGS 1995b). According to the El Paso County Planning Department, the area directly underlying Schriever AFB includes minor or no water-bearing formations (EPCPD 2003).

The Laramie-Fox Hills Aquifer varies between 50 and 300 feet in thickness and is about 300-feet deep in the vicinity of Schriever AFB (USGS 1984; USGS 1995b). Water yields in the Laramie-Fox Hills Aquifer are low, and therefore have not been used extensively as water supplies. Water taken from some areas of the Laramie-Fox Hills Aquifer can be of marginal value due to oxygen deficient conditions which give rise to hydrogen sulfide and methane gases (USGS 1995b). Water in the Arapahoe Aquifer generally is a sodium bicarbonate or sodium sulfate type. The dissolved-solids concentrations of the water generally range from 200 to 400 milligrams per liter in the vicinity of Schriever AFB. The Denver Basin is recharged principally by the downward percolation of only a small part of the area's precipitation (USGS 1995b). Groundwater flow in both the Arapahoe Aquifer and the Laramie-Fox Hills Aquifer is toward the north-northeast.

The proposed sites to be developed under the Base General Plan are underlain by about 25 to 100 feet of Quaternary alluvium (primarily sand and gravel) from tributaries of the Arkansas River (EPCPD 2003; USGS 1984; USGS 1995a). The depth to groundwater at the Base is not known; however, the depth to groundwater in the vicinity is about 40 to 50 feet (USGS 2006b; Colorado Division of Water Resources [CDWR] 2006).

Most water wells in the vicinity of Schriever AFB obtain water from alluvial aquifers. There are about 41 off-base water wells within a mile of Schriever AFB and 17 on-base wells. Most of these wells are used for stock watering and domestic supply. Four of these wells are used for monitoring water quality (CDWR 2006). The Base's water supply is provided by 12 wells in the Upper Black Squirrel Designated Groundwater Basin that are owned and operated by the Cherokee Metropolitan District (CMD). The center of this aquifer is near the community of Ellicott, six miles east of the eastern Base boundary. Schriever AFB has no subsurface water rights; therefore, any wells within the proposed project area will not be pumped.

Surface Water. Schriever AFB lies within the Chico Creek Watershed (USGS hydrologic unit catalog 11020004) in a semi-arid environment, which is typified by a limited number of streams. Average annual precipitation (rainfall and snow) is 58 inches (SAFB 2009a). Stormwater drainage generally flows south-southeast across the installation.

There are no perennial or intermittent streams that flow across Schriever AFB. There are, however, three ephemeral streams that flow across the Base (**Figure 4**). Based on lack of connectivity, Schriever AFB has applied to the U.S. Army Corps of Engineers (USACE) for a legal determination that the two drainages do not meet the criteria of waters of the United States or tributaries of waters of the United States. No proposed activities would take place within the ephemeral streams.

Two of the on-base channels are generally parallel and flow from north to south through the RA and then continue southeast to the southern border of Schriever AFB and beyond. These streams have deeply cut channels, as deep as 15 feet from the surrounding land. They flow about 7 miles south of the Base where they discharge into the ground near Chico Creek (EPCPD 2003; USGS 1975a; USGS 1975b). The third on-base stream, a tributary of the West Fork of the Black Squirrel Creek, originates approximately 2 miles north of Schriever AFB and flows just inside the northeast corner of the Base. It then joins Black Squirrel Creek southeast of the Base. There are also several ephemeral tributaries to Black Squirrel Creek in the area.

Past development has generated increased flows and significant erosion along drainage channels in the RA (USAF 2003). Much of this development took place before NPDES permit requirements limited discharge from new construction to pre-construction sediment yield and stormwater flow velocity levels. The present storm drainage system consists of a series of swales, ditches, and erosion control structures (SAFB 2009a). There are stormwater drainage ditches along Enoch Road and Irwin Avenue west of the RA. These ditches drain to a drainage channel about 750 feet south of the intersection of Irwin Avenue and Enoch Road. This drainage channel drains into an ephemeral stream channel. Culverts exist in these drainages in improved and semi-improved land areas. Energy dissipation structures (such as concrete aprons and riprap) are in place to minimize erosion at culvert openings and discharge points. In addition, five erosion control dams have been constructed north of the secure area (USAF 2005a).

Thunderstorms can result in stream flows in the ephemeral channels of several thousand cubic feet per second, causing temporary flooding. During or after precipitation or snowmelt, flow cannot be reliably predicted. The stream beds and banks are especially susceptible to erosion, as they are sandy and support little or no vegetation.

Schriever AFB historically utilized sewage lagoon ponds south of the RA and east of Sputnik Street. These lagoons were closed in 2003. Sampling performed at the time of closure indicated cadmium,

molybdenum, benzene, and selenium over regulatory limits in the sewage sludge and below the liner. The sludge and soil were disposed of in a hazardous waste landfill and the area was regraded. One pond remains to collect outflow from chillers. Streams on and in the vicinity of Schriever AFB, including Chico Creek and Black Squirrel Creek, meet all water quality standards (USEPA 2006).

There are two playas (seasonal lakes) in the northwest part of the Base. Two small ephemeral lakes are located in the southeastern corner of the Base (USGS 1975b). There are also two ephemeral lakes east of the RA. None of the surface water features on Schriever AFB are identified as waters of the United States (USAF 2005b).

Since original construction, development on Schriever AFB has resulted in drainage patterns that have caused significant erosion in the RA of the installation and substantial downcutting of existing drainage channels. The erosion of vegetative cover left the unprotected soil vulnerable to rapid and progressive displacement, contributed to excessive loss of topsoil, and filled a detention pond in the RA. During periods of heavy rain, flows leaving the installation were historically uncontrolled. Within the RA, the eastern drainage has eroded (both horizontally and vertically) and the detention area within the drainage filled with sediment, causing a lack of storage space for flood flows. In addition, considerable erosion occurred within side channels that conveyed water from the developed portion of the installation to the eastern drainage channel. Generally, the side channel erosion was downstream from culverts that delivered water to the side channels. The western drainage channel has also experienced several erosion problems. The channel became deeply incised and the erosion exposed a length of storm sewer pipe, which has broken due to flood flows (SAFB 1999). Current erosion problems within the western channel are destabilizing existing channels. Furthermore, new channels are continually being created, and minor erosion is occurring at numerous locations throughout the installation (SAFB 2009a).

Several erosion-control measures have been taken or are planned at Schriever AFB. Culverts have been constructed in these drainages in the improved and semi-improved land areas. Energy dissipation structures such as concrete aprons and riprap have been constructed at culvert openings and discharge points to minimize erosion. In addition, five erosion-control dams have been constructed north of the RA in the eastern drainage channel (USAF 2008). Similar to the erosion-control structures on the eastern side of the RA, erosion-control projects on the western side are also planned. Plans include adding new or modifying existing culverts, drainage swales, and diversion weirs. Regrading channels and adding, replacing, or repairing riprap is also required on an ongoing basis to stem the accelerated erosional processes taking place (SAFB 2009a).

Floodplains. The FEMA prepares and updates Flood Insurance Rate Maps (FIRMs) for most areas of the U.S. These maps delineate the 100-year floodplain, which is an area subject to a 1 percent probability of a certain size flood occurring in any given year. The 100-year flood is commonly used to identify areas where the risk of flooding is significant.

The only area within Schriever AFB that contains mapped floodplain areas is in the northeast corner of the Base where approximately 8.5 acres are delineated within the 100-year floodplain of the West Fork of Black Squirrel Creek (FEMA FIRMs Number 08041C0800F, dated 17 March 1997). The next closest mapped floodplain to the Base is situated approximately ½ mile southwest of the Base on an intermittent tributary of Chico Creek.

Wetlands. The USACE completed wetlands evaluations for Schriever AFB in 1991 and 2000 (USAF 2001). Many of the wetlands identified in the earlier evaluation had completely disappeared or been reduced significantly in size by 2000. Changes in the size and status of wetlands since 1991 are largely attributed to declines in effective precipitation in past decades. With sufficient rainfall, previously identified wetlands likely would still pond water, but may not be classified as jurisdictional wetlands.

Three small wetlands were identified at Schriever AFB in the more recent USACE evaluation, totaling approximately 1 acre. Of these, two are near but not within the areas of the Proposed Action (**Figure 4**) and are located within the two playas (natural depressions) in the northwest corner of the Base. Within the northern playa, less than 1 acre of wetland exists, according to the 2000 evaluation. Approximately 900 square feet of wetlands exist within the southern playa.

3.2.7 Biological Resources

The following sections describe the existing condition of biological resources at Shriver AFB. Most of the information in this section was obtained from the current INRMP for Shriver AFB (USAF 2008). Vegetation, wildlife, invasive species, and state and federally threatened and endangered species are discussed below, and represent the current conditions in the Proposed Action areas.

3.2.7.1 Definition of the Resource

Biological resources include native or naturalized plants and animals and the habitats in which they exist. Sensitive and protected biological resources include species listed as threatened or endangered by the Federal government or state agency. This section describes the existing biological environment at Schriever AFB and within the Proposed Action areas. The focus is on vegetation, wildlife, and protected and sensitive e species known or likely to occur within the proposed project area that would be affected by the Preferred Alternative should it be implemented. These topics were selected on the basis of Federal law, regulations, EOs, and concerns expressed during the project scoping. The ROI for biological resources at Shriver AFB is the installation itself.

Protected and sensitive biological resources include federally listed (endangered or threatened), proposed, and candidate species, and designated or proposed critical habitat; species protected under other Federal laws; species of concern managed under Conservation Agreements or Management Plans; and state-listed species.

3.2.7.2 Requirements

The ESA (16 USC 1536) of 1973 establishes a Federal program to conserve, protect, and restore threatened and endangered plants and animals and their habitats. Under the ESA, an "endangered species" is defined as any species in danger of extinction throughout all or a significant portion of its range. A "threatened species" is defined as any species likely to become an endangered species in the foreseeable future. Under the ESA, Federal agencies are required to provide documentation that ensures that agency actions will not adversely affect the existence of any federally threatened or endangered species. The ESA requires that all Federal agencies avoid "taking" threatened or endangered species (which includes jeopardizing threatened or endangered species habitat).

Section 7 of the ESA establishes a consultation process with U.S. Fish and Wildlife Service (USFWS) that ends with concurrence on a determination of the risk of jeopardy from a Federal agency project.

The USFWS also maintains a list of species considered to be candidates for possible listing under the ESA. Although candidate species receive no statutory protection under the ESA, the USFWS has attempted to advise government agencies, industry, and the public that these species are at risk and might warrant protection under the Act. All Federal agencies must ensure any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a threatened and endangered species or result in the destruction of critical habitat for these species, unless the agency has been granted an exemption. AFI 32-7064, Integrated Natural Resource Management, provides the Air Force with guidance on compliance with the ESA and Federal, state, and local environmental regulations.

Other applicable requirements pertaining to biological resources include the Migratory Bird Treaty Act [16 U.S.C. Sec. 703-711], which imposes substantive obligations on Federal agencies to protect migratory birds and their habitats; and AFI 32-1053, *Pest Management*, which provides the Air Force with guidance on managing noxious weeds.

3.2.7.3 Existing Condition

Vegetation. Historic vegetation at Schriever AFB (i.e., prior to European settlement) was largely shortgrass prairie interspersed with wetlands, and was mostly treeless. Wildland fires occurred with a frequency of less than 35 years and impacted the distribution and composition of species. Prior to installation acquisition, the area contained three homesteads and the land was used primarily for livestock grazing for more than a century. As a result, the shortgrass prairie ecosystem has been significantly altered. Since groundbreaking at Schriever AFB in 1983, changes have included the construction of roads and buildings, and planting of trees in the RA. Livestock grazing permits on undeveloped lands outside of the RA were terminated in early 2005 (USAF 2008). Schriever AFB currently contains two natural ecosystems—shortgrass prairie and wetlands. Two man-made ecosystems (landscaped areas around buildings and urban forest), are present within the RA.

Native vegetation on Schriever AFB is consistent with the Western Great Plains shortgrass prairie ecosystem and is dominated by blue grama (*Bouteloua gracilis*), buffalo grass (*Buchloe dactyloides*), three-awned grass (*Aristida purpurea*), dropseed (*Sporobolus cryptandrus*), and needle-and-thread grass (*Stipa comata*) (USAF 2008). Upland areas are in good condition, although species composition has been altered by heavy grazing in the past (CNHP 2000). The prairie is spotted with playas that primarily support saltgrass (*Distichlis spicata*), two spikerushes (*Eleocharis palustrus* and *E. aciculais*), and sedge (*Carex* sp.) (USAF 2008). Discrete stands of trees are located along a draw south of Enoch Road near the industrial warehouse area, around three former farmsteads, and near a windmill southeast of the RA. Trees south of Enoch Road are mature cottonwood (*Populus sargentii*). Around the farmstead and windmill, trees are primarily box elder (*Acer negundo*) and hawthorn (*Crataegus* sp.) (USAF 2008).

Schriever AFB is also home to the globally rare plains ragweed (*Ambrosia linearis*), which only occurs on the high plains of Colorado. El Paso County is one of six counties that contain 30 known locations of this species (CNHP 2000). It is a ragweed relative that is usually wind-pollinated from mid-June to August, and is associated with seasonally moist habitats. An area of less than 40 acres on Schriever AFB has been identified as harboring the species and providing suitable habitat (CNHP 2000) (**Figure 4**). Though not federally listed, plains ragweed is considered a species of concern by the USFWS. The nearest construction activity (the antennae farm, which is part of the Accelerated Construction Alternative) would be located immediately northeast of the plains ragweed habitat on Schriever AFB.

Man-made ecosystems are also present on Base and include landscaped areas around buildings and the urban forest. Landscaped areas at Schriever AFB consist of irrigated turf grasses, native grass plantings, and native and ornamental shrubs and trees. The landscaped areas include the Base entryway, Falcon Parkway, medians within the parking areas, and recreational areas. A Xeriscape and Water Conservation Plan is in place to reduce the amount of acres of land that are irrigated. More than 90 percent of the trees are located within the restricted zone of the Base and have been planted since the Base was constructed in 1985. Other trees are planted along Falcon Parkway and within the median dividers in the parking lots. The tree composition is approximately 45 percent coniferous trees and 55 percent deciduous trees (USAF 2008).

An Urban Forestry Management Plan Survey Report prepared in 2000 documents over 2,200 woody plants (World Tree, Inc. 2000). An inventory of tree type, location, size, quality, and safety was also completed (Harland Bartholomew & Associates, 1997).

During a survey conducted in 2004 (USAF 2008), seven species of state and federally listed noxious weeds were identified on Schriever AFB: Canada thistle (*Cirsium arvense*), field bindweed (*Convolvulus arvensis*), diffuse knapweed (*Centaurea diffusa*), spotted knapweed (*Centaurea maculosa*), musk thistle (*Carduus nutans*), puncturevine (*Tribulus terrestris*), and Russian olive (*Elaeagnus angustifolia*). Six other invasive species also were found during the field surveys, including cheatgrass (*Bromus tectorum*), Russian thistle (*Salsola kali*), kochia (*Kochia scoparia*), tumble mustard (*Sisymbrium altissimum*), yellow sweetclover (*Melilotus officinalis*), and goatsbeard (*Tragopogon dubius*).

Wildlife. Schriever AFB is home to 26 bird species, 13 species of mammals, and 2 reptile species typical of the shortgrass prairie. Since the perimeter fence was installed at the Base, observations indicate that biodiversity on the Base has largely been maintained. In several places, it appears that coyotes have dug under the fence allowing rabbits, swift fox, and other small mammals to ingress/egress. Because there is no hunting or fishing at Schriever AFB, the primary fish and wildlife management issue involves maintaining habitat for wildlife species. Native fauna at Schriever AFB largely consist of species associated with the shortgrass prairie. Trees around old homesteads or planted on developed portions support additional species that might not otherwise be found in the area. A complete list of wildlife species identified at Schriever AFB is provided in the INRMP (USAF 2008). Wildlife species of primary concern for management at Schriever AFB include the black-tailed prairie dog (*Cynomys ludovicianus*) and burrowing owl (*Athene cunicularia*), which utilize similar habitat, and pronghorn (*Antilocapra americana*).

Black-tailed prairie dogs have been of management concern recently because of their associated habitat with the burrowing owl, a state-listed threatened species and protected species under the Migratory Bird Treaty Act. In recent years, the black-tailed prairie dog has encroached into installation boundaries and populations have expanded rapidly. Surveys in 2002 identified three separate black-tailed prairie dog towns occupying 62 acres. In 2004, they had grown to five towns totaling approximately 129 acres, and most recent mapping confirms that seven black-tailed prairie dog towns occupy approximately 275 acres (USAF 2008). Growth of black-tailed prairie dog towns has been modest since 2005 as a result of increased vegetation height from lack of livestock grazing (the extent of black-tailed prairie dog colonies as of 2005 is shown in **Figure 4**). With this expansion of black-tailed prairie dog complexes, habitat was created for the burrowing owl, which was first observed in November 2001. Burrowing owls do not dig their own burrows, but nest and roost in abandoned rodent burrows and, more commonly, within prairie dog colonies. Historic burrowing owl nest locations are shown on **Figure 4**.

Migratory Birds. Schriever AFB is located within the Central Flyway, also called "the flyway of the Great Plains," which extends from Canada to the Gulf of Mexico. It encompasses the entire region lying between the Mississippi River Valley and the Rocky Mountains. *Birds of Conservation Concern 2008*, a USFWS report issued by the Division of Migratory Bird Management, identifies 45 species of migratory birds that occur in USFWS Region 6, which includes Colorado (USFWS 2008). The USFWS places Colorado Bird Conservation Region 18 as one of the highest conservation priorities (USFWS 2008). Of the 45 migratory bird species, two have been identified recently at Schriever AFB, the burrowing owl and lark bunting (*Calamospiza melanocorys*) (CNHP 2000; USFWS 2008; SAFB 2009c). Four other species with the potential to occur on the installation include the bald eagle (*Haliaeetus leucocephalus*), ferruginous hawk (*Buteo reglais*), and Mexican spotted owl (*Strix occidentalis lucida*). The Migratory Bird Treaty Act of 1918 (16 USC 703–712) as amended, and EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, require Federal agencies to minimize or avoid impacts on migratory birds listed in 50 CFR 10.13. If design and implementation of a Federal action cannot avoid measurable negative impact on migratory birds, EO 13186 requires the responsible agency to consult with the USFWS and obtain a Migratory Bird Depredation Permit.

Threatened and Endangered Species. No known federally threatened, endangered, or proposed threatened or endangered species occur on Schriever AFB. The state-listed threatened burrowing owl and state species of special concern black-tailed prairie dog are present at Schriever AFB. Other Federal- and state-threatened and endangered species in the general area of Schriever AFB that have the potential to exist on the installation include the northern leopard frog (*Rana pipiens*), bald eagle, Mexican spotted owl, ferruginous hawk, mountain plover (*Charadrius montana*), Preble's meadow jumping mouse (*Zapus hudsonius preblei*), lynx (*Lynx canadensis*), and the swift fox (*Vulpes velox*) (USAF 2008; Colorado Division of Wildlife [CDOW] 2011). A list of these species and their status is presented in **Table 9**.

The general location of species and habitats of concern (i.e. prairie dog towns) known to exist at Schriever AFB is illustrated in **Figure 4**. All Federal agencies must use their existing authorities to conserve threatened and endangered species, and if there is a potential for impacts on listed species to occur, consult with the USFWS to ensure that their actions do not jeopardize listed species or adversely modify proposed or designated critical habitat.

Table 9. Species of Concern potentially occurring at Schriever Air Force Base, Colorado.

Common Name	Scientific Name	Status	Occurrence
Amphibians			
Northern leopard frog	*Rana pipiens*	SC	Does not exist on Base
Birds			
Bald Eagle	*Haliaeetus leucocephalus*	FT, ST	Does not exist on Base
Burrowing Owl	*Athene cunicularia*	ST	Migratory Resident
Mexican Spotted Owl	*Strix occidentalis lucida*	FT, ST	Does not exist on Base
Ferruginous Hawk	*Buteo regalis*	SC	Does not exist on Base
Mountain Plover	*Charadrius montana*	SC	Does not exist on Base
Mammals			
Black-Tailed Prairie Dog	*Cynomys ludovicianus*	SC	Permanent Resident
Preble's Meadow Jumping Mouse	*Zapus hudsonius preblei*	FT, ST	Does not exist on Base
Lynx	*Lynx canadensis*	ST, SE	Does not exist on Base
Swift Fox	*Vulpes velox*	SC	Does not exist on Base
Status Codes: FE = Federally Endangered; FT = Federally Threatened; SE = State Endangered; ST = State Threatened; SC = State Special Concern			

3.2.8 Utilities and Infrastructure

3.2.8.1 Definition of the Resource

Infrastructure consists of the systems and physical structures that enable a population in a specified area to function. Infrastructure is wholly human-made, with a high correlation between the type and extent of infrastructure and the degree to which an area is characterized as "urban" or developed. The availability of infrastructure and its capacity to support growth are generally regarded as essential to the economic growth of an area. The infrastructure information provided below was primarily obtained from the *Schriever Air Force Base General Plan* and provides a brief overview of each infrastructure component and comments on its existing general condition. The infrastructure components to be discussed in this section include utilities and solid waste management.

Utilities include electrical, natural gas, liquid fuel, central heating and cooling, water supply, sanitary sewage/wastewater, stormwater handling, and communications systems. Solid waste management primarily relates to the availability of landfills to support a population's residential, commercial, and industrial needs. Alternative means of waste disposal might involve waste-to-energy programs or incineration. In some localities, landfills are designed specifically for, and limited to, disposal of construction and demolition debris. Recycling programs for various waste categories (e.g., glass, metals, papers, asphalt, and concrete) reduce reliance on landfills for disposal.

3.2.8.2 Requirements

AFI 32-7042, *Waste Management*, identifies compliance requirements for all solid waste, including hazardous waste.

A NPDES permit, or modification to an existing permit, would be required for any change from the present parameters in the quality or quantity of wastewater discharge and/or stormwater runoff.

A Construction General Permit from USEPA Region VIII would be required for any activities disturbing more than one acre of land. The permit outlines provisions construction operators must follow to comply with the requirements of NPDES regulations. Site-specific SWPPPs may need to be developed. A separate NPDES permit is required for each construction project on the base, in accordance with the requirements of Section 402 of the CWA (projects impacting one or more acres where stormwater runoff would potentially impact waters of the U.S.). Other stormwater management requirements are outlined in **Section 3.2.6**, Water Resources.

3.2.8.3 Existing Conditions

Electrical Systems. The Western Area Power Administration and the Tri-State Generation and Transmission Association currently provide electricity to Schriever AFB through a Mountain View Electrical Association (MVEA) 115-kilovolt (kV) transmission line servicing a substation in the eastern portion of the RA (east of Building 600). Two 15/20/25 megavolt, 115 kV, 3-phase transformers at the substation step the power down to 12.47 kV for delivery to the Schriever primary distribution grid (SAFB 2008a). Each transformer has enough capacity to accommodate the entire base load. This double capacity provides redundancy in the event that one transformer is de-energized. There is one electrical feed from outside the base and two feeds from the electrical substation to the installation.

From October 2007 to September 2008 Schriever AFB's power consumption was 77,380 megawatt hours (MWH) (SAFB 2009a). Schriever AFB currently procures 150 MWH of power produced from renewable resources per month from MVEA. Backup power is provided by seven diesel engine generators, located in building 600, capable of producing a combined total of 16.5 megawatts (MW) of electrical power. There are also additional generators on the installation: two in building 700, four in building 712, and one in building 412.

The electrical power system has approximately 1.5 MW of residual capacity for mission critical loads. The current limitation for additional critical mission loading is the emergency electrical diesel generators, which can provide only 11.5 MW on a long-term basis. Only five of the seven generators are needed for long-term emergency power with one in reserve and one in maintenance status. Only five are needed to meet the current power demands but all seven could be run continuously if needed. Facilities outside the RA are supplied power by the older MVEA system. These non-mission critical loads are not powered by the emergency system and are not functional during any commercial power outage.

Natural Gas Systems. Seminole Energy supplies natural gas for Schriever AFB with transportation and delivery provided by Black Hills Corporation. Except for the buildings serviced by an installation wide HVAC system, all buildings on Schriever AFB have separate heating and air conditioning units powered by natural gas. Natural gas enters the installation from the north through a 350-pound-per-square-inch pipeline capable of providing up to 900 million cubic feet (MCF) of natural gas per hour. Schriever AFB

uses an average of 22.74 MCF/hour and has a peak usage of 33.08 MCF/hour (SAFB 2009a). The main natural gas distribution lines on the Base are 6 inches in diameter. Most of the distribution lines to each building off the main line are 1 and 2 inches in diameter. The installation has considerable excess capacity for natural gas (SAFB 2009a).

Liquid Fuel. Diesel fuel is used at Schriever AFB to power emergency backup electric generators. Diesel fuel is delivered to Schriever AFB and stored in three 25,000-gallon above ground storage tanks located within the RA. Gasoline is also delivered to Schriever AFB for use at the military gas station within the RA and for use at the Army and Air Force Exchange Services (AAFES) gas station outside of the RA (SAFB 2009a). The liquid fuel system is adequate to support project growth (SAFB 2009a).

Central Heating and Cooling Systems. A central HVAC system at Schriever AFB provides heating and cooling to buildings on a portion of the installation through a series of underground conduits totaling 2,600 feet in length. The buildings not serviced by the central HVAC system are heated and cooled by individual units powered by natural gas. Four natural gas boilers, each rated at 13.39 million British thermal units, produce steam for heat and hot water for domestic use and air humidification. Three 950-ton chillers provide cold water to a portion of the installation for air conditioning and industrial uses. During the winter months, two boilers and two chillers are required to handle the heating and cooling load; during the summer, one boiler and up to three chillers are required (SAFB 2009a). The current HVAC system can support moderate growth at Schriever AFB (SAFB 2009a).

Water Supply Systems. The water supply system at Schriever AFB is over 23 years old with no major upgrades since original construction. Recent general upgrades and safety enhancements include installation of new flow meter instrumentation for billing verification and inspection and maintenance of water pumps. The CMD provides potable, chlorinated water to Schriever AFB from 12 shallow wells located within the Upper Black Squirrel Designated Groundwater Basin. The water is delivered via a 10-inch pipeline and is stored at two holding tanks with a combined capacity of 3.6 million gallons located within the RA south of the Colorado Tracking Station. The water pumping station located at the tanks consists of five pumps: two for domestic use and three for fire protection.

The total water system at Schriever AFB has a capacity to provide approximately 1.3 million gallons per day; however, Schriever AFB is contracted with CMD to supply 537 acre-feet per year (175 million gallons per year) to Schriever, with a maximum daily usage of 720,000 gallons per day. The actual average daily water use at Schriever AFB in 2007 was 229,000 gallons. Schriever AFB has recently voluntarily reduced its water requirement to help conserve water; previously the Base used two-thirds of its water supply for landscape irrigation, which it has since decreased dramatically. Thus, water supply is adequate to support existing and future development at Schriever AFB (SAFB 2009a).

Sanitary Sewer/Wastewater Systems. Schriever AFB does not have its own sewage treatment facility. The sanitary sewer system currently consists of 8-inch pipes conveying wastewater to a lift station in the south-central portion of the installation, which then transports the wastewater to a CMD treatment plant at Peterson AFB (SAFB 2009b). Schriever AFB is currently permitted by CMD to produce 101,000 gallons of wastewater per day (SAFB 2007a). Some facilities on the installation are not served by the sanitary sewer system; these facilities instead use isolated, onsite septic systems to dispose of wastewater (SAFB 2009a).

Schriever AFB is planning to expand the sanitary sewer system by adding two additional sewer lines to service existing peripheral buildings and future development along the east and west side of the RA. CMD is also constructing a new treatment facility to the east of the installation. Once complete, wastewater from Schriever AFB will be conveyed to this facility (SAFB 2009a).

Stormwater Systems. Man-made stormwater drainage systems, which include swales, ditches, and erosion-control structures, direct stormwater from developed to undeveloped portions of the installation. Since original construction, installation development has resulted in less than optimal drainage patterns and has caused significant erosion in the RA. The western main drainage channel suffers from erosion problems, and the erosion is destabilizing existing channels, while new channels are continually being created (SAFB 2009a). Similar to the erosion control structures on the eastern side of the RA, erosion control projects on the western side are also planned, as described in **Section 3.2.6.3**.

Communications Systems. Schriever AFB has an extensive communications equipment system that allows the installation to operate a worldwide network of dedicated and common-user satellite systems. Included in this communications system are optical fiber cables, copper wiring, radio frequency antennas, microwave antennas, and satellite antennas. Work has been ongoing and continues to replace copper wire with fiber optic cables to improve bandwidth. The data network is satisfactory for current needs, but will require continued improvement as the installation grows (SAFB 2009a).

Solid Waste Management. Municipal solid waste and recyclable materials generated at Schriever AFB are collected by contractors and disposed of at an off-installation landfill. Schriever AFB does not have any disposal facilities on the installation. Construction and demolition debris is disposed of off site on a contract-by-contract basis. The contractor providing solid waste disposal services also maintains a recycling program for paper, aluminum cans, scrap metal, plastic bottles, cardboard, and copper. Recycling of usable materials from construction and demolition activities is mandatory. In 2007, Schriever AFB disposed of 943 tons of solid waste and 90 tons of construction and demolition debris. In addition, 129 tons of materials were recycled and 24 tons of construction and demolition debris were diverted from the landfill (SAFB 2008b).

3.2.9 Transportation

3.2.9.1 Definition of the Resource

The transportation resource is defined as the system of roadways and highways and alternative forms of travel including ground, rail, and air that are within and in the vicinity of the proposed project areas that could potentially be impacted by a Proposed Action. Primary roads, such as major interstates, are the principal routes designed to move traffic efficiently but not necessarily to access all adjacent areas. Secondary roads or arterials, such as major surface streets, provide access to residential and commercial areas. The resource also includes parking, access to the installation, and vehicular movement within the installation.

3.2.9.2 Existing Conditions

The transportation system in El Paso County includes one major north-south directional freeway, Interstate 25 (I-25), which connects Colorado Springs and other Front Range metropolitan areas. U.S. Highway 24 (US 24) and Colorado State Highway 94 (SH 94) are the two major east-west directional arterials.

The City of Colorado Springs is the nearest transportation center to Schriever AFB and is serviced by interstate highway, rail, bus, and air transportation systems. Colorado Springs Airport, which is a joint-use facility with Peterson AFB, provides commercial and military air facilities to the Colorado Springs area. A light rail runs north-south along the Front Range with service available in Colorado Springs.

In the immediate vicinity, a network of county roads and state roads surrounds Schriever AFB and provides access to the installation. SH 94, the only state road servicing Schriever AFB, intersects with Enoch Road, which runs south to Falcon Parkway. Enoch Road provides primary vehicular access to the installation from the north via the main entrance to Schriever AFB near the northwest boundary. Irwin Road provides access to the west gate, which is used primarily by workers and commercial vehicles. Privately owned vehicle access is limited within the RA; therefore, two external parking areas are made available for general use. The north parking area consists of a group of paved lots that provide more than 1,087 parking spaces and is adjacent to Falcon Parkway. At the Pass and Registration building, a small paved lot also provides 2-hour parking for those processing into the installation. West of the RA there is a second (1,450-vehicle) external parking area that is usually filled to capacity during working hours (SAFB 2009a).

El Paso County's most recent Major Transportation Corridors Plan reported that all roads near Schriever AFB (Enoch Road, Curtis Road, Peyton Highway, Drennan Road, and SH 94) are considered uncongested roads (EPCDOT 2004). However, there are two major points of traffic congestion on Schriever AFB: (1) immediately south of the processing center on Enoch Road, and (2) farther south at the Enoch Road and Irwin Avenue intersection (SAFB 2009a).

4. ENVIRONMENTAL CONSEQUENCES

This chapter discusses the potential for significant impacts to the human environment as a result of implementing the Preferred Alternative, the Accelerated Construction Alternative, and the No Action Alternative. As defined in 40 CFR Section 1508.14, the human environment is interpreted to include natural and physical resources, and the relationship of people with those resources. Accordingly, this analysis has focused on identifying types of impacts and estimating their potential significance. This chapter discusses the potential effects of each alternative on the environmental resource areas described in detail in Chapter 3.

The concept of "significance" used in this assessment includes consideration of both the context and the intensity or severity of the impact, as defined by 40 CFR 1508.27. Severity of an impact could be based on the magnitude of change, the likelihood of change, the potential for violation of laws or regulations, the context of the impact (both spatial and temporal), and the resilience of the resource. Significant impacts are effects that are most substantial and should receive the greatest attention in decision-making. Impacts that are not significant include those that result in little or no effect to the existing environment and cannot be easily detected. If a resource would not be affected by a proposed activity, a finding of no impact was declared. If a resource would be improved by a proposed activity, a beneficial impact was noted.

This chapter is organized by resource element in the same order as introduced in **Chapter 3** and provides a discussion of analysis methods and the potential impacts of the three alternatives. The chapter concludes with an evaluation of the relationships between short-term uses of the environment and long-term productivity, cumulative impacts, and irreversible and irretrievable commitments of resources.

4.1 Air Resources

This section discusses impacts to regional air quality associated with each action alternative.

4.1.1 Analysis Methods

The air quality analysis was based on a review of existing regional air quality, the latest air emissions inventory for Schriever AFB (i.e., calendar year 2009 [SAFB 2011]), estimates of emissions from the proposed activities based on methodology and emission factors from the USAF and USEPA, and a review of the Federal and Colorado air quality regulations as these apply to emission levels.

Emission estimates were based on the project size, construction parameters, and operation parameters summarized in **Table 10** and **Table 11**. The construction and operational emissions associated with each Alternative are summarized in **Table 12** and **Table 13**, respectively. Emission calculation details are provided in **Appendix B.**

Table 10. Approximate extent of projects included in Alternatives 1 and 2.

Area	Proposed Component	Approx. Extent (square feet)	Disturbed Area (acres)	Building Area (square feet)	Paved Area (square feet)	Project Timeline
Activities included in Alternative 1	**TOTAL**	**1,239,812**	**26.0**	**439,000**	**532,700**	**6 years**
Community Center ADP	SFS Operation Facility	50,200	1.2	41,900	---	2015
	Addition to Fitness Center	34,000	0.8	28,400	---	2014
	Car Wash	2,400	0.1	2,000	---	2009-2014
	Roller Hockey field	19,600	0.4	---	---	2009-2014
	Youth Center	14,400	0.3	12,000	---	2009-2014
	Airman & Family Readiness Center/Chapel	31,600	0.7	26,300	---	2012
West Campus ADP	None	---	---	---	---	---
Outside the RA (Non-ADP)	Electrical Substation	6,000	0.1	---	---	2015
	Enoch/Irwin Road Improved Intersection	---	---	---	---	2009-2014
	Military Gas Station	48,400	1.0	---	---	2009-2014
	25 SCTS Maintenance Facility	303,600	7	253,000	---	2009-2014
	Consolidated SFS Training Facility	32,400	0.7	27,000	---	2013
Inside the RA (Non-ADP)	Weather Station	12	0.0	---	---	2009-2014
	NOG/NRO Building	29,000	0.7	24,200	---	2009-2014
	Administrative Building	29,000	0.7	24,200	---	2009-2014
	Sidewalks and Bicycle Paths	90,000	2.1	---	90,000	2010-2014
All	Road/Parking Improvement	531,200	12.2	---	442,700	2009-2014

Table 10. (continued).

Area	Proposed Component	Approx. Extent (square feet)	Disturbed Area (acres)	Building Area (square feet)	Paved Area (square feet)	Project Timeline
Additional Activities included in Alternative 2	**TOTAL**	**5,378,100**	**123.5**	**894,7000**	**367500**	**6 years**
Community Center ADP	Education Center/Library	8,800	0.2	7,300	---	2021
	Fire Station	19,100	0.4	16,000	---	2017
West Campus ADP	Dining Facility (Burger King)	2,900	0.1	2,400	---	2015-2021
	Services Mall	15,900	0.4	13,300	---	2018
Outside the RA (Non-ADP)	Civil Engineer Complex*	642,000	14.7	535,000	---	2018
	Transportation Complex*	186,500	4.3	155,400	---	2015-2021
	Addition to Medical/Dental Clinic	18,700	0.4	15,600	---	2015-2021
	OPS Administrative Facility	29,200	0.7	24,300	---	2019
	Antenna Farm*	3,863,500	88.7	---	---	2015-2021
Inside the RA (Non-ADP)	Two Future RA Mission Buildings	150,500	3.5	125,400	---	2015-2021
All	Road/Parking Improvement	441,000	10.1	---	367,500	2015-2021

* The extent listed for these items includes the entire conceptual footprint (the actual extent would likely be less, although the actual extent will not be known until more detailed designs are completed).

Note: The extents listed above were calculated by adding 20 percent to Government-provided footprints/extents to account for temporary disturbances from construction.

Table 11. Emission calculation parameters for Alternatives 1 and 2.

Phase	Activity [(A)]	Parameter	Units [(A)]	Activities included in Alternative 1	Additional Activities included in Alternative 2
Construction	Fugitive Dust - Grading	Grading	Hours	824	3,655
	Fugitive Dust - Construction Traffic	Trucks on Paved Roads	Miles	46,800	95,400
		Trucks on Unpaved Roads	Miles	5,328	10,848
	Fuel Combustion - Construction Traffic	Worker Commuter Vehicles	Miles	2,340,000	2,340,000
		Trucks on Paved Roads	Miles	46,800	95,400
		Trucks on Unpaved Roads	Miles	5,328	10,848
		Water Trucks	Miles	7,500	15,000
	Fuel Combustion - Grading	Scraper	Hours	552	2,384
		Bulldozer	Hours	1,648	7,152
		Grader	Hours	824	3,576
		Roller	Hours	168	712
		Backhoe/Loader	Hours	216	952
	Fuel Combustion - Paving	Paving Equipment	Hours	56	240
		Asphalt Paver	Hours	56	240
		Dump Truck	Hours	504	2,160
		Roller	Hours	56	240
	Fuel Combustion - Building Construction	Crane	Hours	15,344	31,264
		Generators	Hours	10,224	20,848
		Air Compressors	Hours	15,344	31,264
		Concrete Truck	Hours	2,384	4,864
	Fuel Combustion - Utility Relocation	Excavator	Hours	3,408	6,944
		Backhoe/Loader	Hours	2,720	5,552
		Bulldozer	Hours	2,720	5,552
		Crane	Hours	344	696
	Asphalt Paving	Hot Mix Asphalt	Tons	19,729	13,611
Operation	Fuel Combustion - Energy Production	Emergency Generators	hour/year	180	240
		Additional Space Heating	cubic feet/ year	19,939,380	40,637,274

(A) Activity and values represent the total for all proposed projects associated with the alternative.

Table 12. Construction emissions analysis.

Alternative	CO	NOx	PM_{10}	$PM_{2.5}$	SO_2	VOC	HAPs	GHGs
Total Emissions for 6-Year Period (tons)								
Activities included in Alternative 1 (tons total)	38.69	9.03	6.75	1.71	0.30	9.69	0.32	2,886
Additional Activities included in Alternative 2	40.26	17.77	14.25	3.76	0.60	17.34	0.37	4,275
Activities included in Alternative 1 + Additional Activities included in Alternative 2	78.95	26.80	21.00	5.47	0.90	27.03	0.69	7,161
Alternative 3	-	-	-	-	-	-	-	-
Annual Average Emissions (ton/yr)								
Alternative 1 (ton/year)	6.45	1.51	1.13	0.29	0.05	1.62	0.05	481
Alternative 2	13.16	4.47	3.50	0.91	0.15	4.51	0.12	1,194
Alternative 3	-	-	-	-	-	-	-	-
Schriever AFB Percent Contribution to El Paso County Emissions (%)								
Alternative 1	0.005%	0.006%	0.004%	NR	0.0004%	0.004%	0.010%	NR
Alternative 2	0.010%	0.018%	0.013%	NR	0.0012%	0.012%	0.022%	NR
Alternative 3	-	-	-	-	-	-	-	-
Schriever AFB Percent Contribution to San Isabel AQCR Emissions (%)								
Alternative 1	0.002%	0.003%	0.002%	NR	0.0002%	0.001%	0.005%	NR
Alternative 2	0.005%	0.008%	0.006%	NR	0.0006%	0.002%	0.012%	NR
Alternative 3	-	-	-	-	-	-	-	-

AQCR = Air Quality Control Region

CO = carbon monoxide

GHG = greenhouse gases

HAP = hazardous air pollutants

NOx = nitrogen oxides

NR = Not reported

PM_{10} = particulate matter less than or equal to 10 micrometers

$PM_{2.5}$ = particulate matter less than or equal to 2.5 micrometer

SO_2 = sulfur dioxide

VOC = volatile organic compounds

(A) Construction emissions = total tons over 6-year project period. Annual average emissions (ton/yr) = Total Tons / 6 year.

(B) Alternative 1 = Activities included in Alternative 1.
Alternative 2 = Activities included in Alternative 1 + Additional Activities included in Alternative 2.
Alternative 3 = No Action.

(C) Percent Contribution (%) = Alternative (ton/year) / regional emissions (ton/year) from Table 5.

Table 13. Operational emissions analysis.

Alternative	CO	NOx	PM_{10}	$PM_{2.5}$	SO_2	VOC	HAPs	GHGs
Annual Emissions (ton/yr)								
Existing Operations	10.04	15.70	2.69	2.69	0.09	6.43	0.66	8,503
Activities included in Alternative 1	1.29	3.44	0.13	0.12	0.006	0.12	0.02	1,123
Additional Activities included in Alternative 2	2.22	5.17	0.21	0.20	0.012	0.19	0.03	2,200
Activities included in Alternative 1 + Additional Activities included in Alternative 2	3.51	8.61	0.34	0.32	0.018	0.31	0.05	3,323
Alternative 3	-	-	-	-	-	-	-	-
Annual Combined Emissions (ton/yr)								
Existing + Alternative 1	11.33	19.14	2.82	2.81	0.10	6.55	0.68	9,626
Existing + Alternative 2	13.55	24.31	3.03	3.01	0.11	6.74	0.71	11,826
Existing + Alternative 3	10.04	15.70	2.69	2.69	0.09	6.43	0.66	8,503
Schriever AFB Percent Contribution to El Paso County Emissions (%)								
Existing + Alternative 1	0.009%	0.077%	0.010%	NR	0.0008%	0.018%	0.130%	NR
Existing + Alternative 2	0.011%	0.098%	0.011%	NR	0.0008%	0.019%	0.135%	NR
Existing + Alternative 3	0.008%	0.063%	0.010%	NR	0.0007%	0.018%	0.126%	NR
Schriever AFB Percent Contribution to San Isabel AQCR Emissions (%)								
Existing + Alternative 1	0.004%	0.034%	0.005%	NR	0.0004%	0.003%	0.069%	NR
Existing + Alternative 2	0.005%	0.043%	0.005%	NR	0.0004%	0.003%	0.072%	NR
Existing + Alternative 3	0.004%	0.028%	0.004%	NR	0.0003%	0.003%	0.067%	NR

AQCR = Air Quality Control Region
CO = carbon monoxide
GHG = greenhouse gases
HAP = hazardous air pollutants
NOx = nitrogen oxides
NR = Not reported
PM_{10} = particulate matter less than or equal to 10 micrometers
$PM_{2.5}$ = particulate matter less than or equal to 2.5 micrometer
SO_2 = sulfur dioxide
VOC = volatile organic compounds
(A) Percent Contribution (%) = Alternative (ton/year) / regional emissions (ton/year) from Table 5.

4.1.2 Potential Impacts of Alternative 1 – Preferred Alternative

Alternative 1 (the Preferred Alternative) would have direct short-term, but not significant, impacts on air quality generated by construction of the proposed facilities. Similarly, operational emissions of the new facilities would not significantly impact regional air emission levels or air quality compliance with the NAAQS, and will not affect the Base's air permit status. Schriever AFB would remain below the 250 ton/year thresholds for PSD review requirements and will continue to be classified as a minor source for HAPs. Also, the Preferred Alternative projects would be exempt from further air conformity review based on proposed increases in CO emission levels for both construction (6.45 ton/year) and operational activities (1.29 ton/year) being below the air conformity analysis threshold of 100 ton/year. **Appendix B** presents detailed calculations of all Alternative 1 air emissions.

Because the Alternative 2 activities would not contribute to an exceedance of the NAAQS and would conform to the El Paso maintenance plan for CO, the impacts would not be significant.

4.1.2.1 Construction Emissions

Construction activities associated with the proposed facilities through year 2015, as outlined in the Base General Plan, would generate emissions of criteria pollutants, HAPs, and GHGs from fuel combustion and fugitive dust associated with construction equipment, trucks, worker vehicles, grading, travel on paved and unpaved roads, asphalt plants, and surface coating. Estimated emissions for the construction phase are shown in **Table 12**. Criteria pollutants would be emitted at 1.62 ton/year or less on an annual average basis during the 6-year project period, except for CO, which would be emitted at approximately 6.45 ton/year on an annual average basis. HAPs would be emitted at 0.05 ton/year. The construction emissions would contribute 0.010 percent or less to the El Paso County criteria pollutant and HAP emissions and 0.005 percent or less to the San Isabel AQCR emissions. GHGs would be emitted at 481 ton/year on average.

Approximately 26 acres of soil would be disturbed during construction with new building area of 439,000 square feet and road/parking/path improvements having an area of 532,700 square feet (see **Table 10**). Best management practices (such as application of water or chemical stabilizers to disturbed areas and revegetating sites) would be implemented to control fugitive dust. A Colorado APEN would not be needed since ground disturbances for each activity would be less than 25 acres.

4.1.2.2 Operational Emissions

Operational activities would generate emissions from increased fuel consumption for space heating of the new building area, and fuel combustion in emergency generators.

It is estimated that three emergency generators would be installed to support proposed mission-critical operations. Other projects developed under the Preferred Alternative are not anticipated to require generators. Emergency generators are subject to APEN requirements and Standards of Performance for New Stationary Sources (i.e., 40 CFR 63, Subpart ZZZZ – *National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*). The total estimated actual emissions from the new and existing stationary sources at the base would remain within permit limits. Estimated emissions for the Alternative 1 operational phase are shown in **Table 13** along with the combined emissions from the existing operations. Alternative 1 would increase Schriever AFB annual operational emissions by approximately 1.29 ton/year for CO (13 percent), 3.44 ton/year for NOx (22

percent), 0.13 ton/year or less for the other criteria pollutants (≤ 7 percent), and 0.02 ton/yr for HAPs (3 percent). For Alternative 1, these additional operational emissions would not be noticeable in the Schriever AFB's percent contribution to the regional emissions (compare **Table 13** with **Table 5**). Schriever AFB would remain at 0.130% or less of the El Paso County emissions and 0.069% or less of the San Isabel AQCR emissions. GHGs would be increased by 1,123 ton/year. A Colorado APEN may be needed for individual stationary emission units depending on the potential emission levels. This would be determined from the actual project design specifications.

4.1.3 Potential Impacts of Alternative 2 – Accelerated Construction

Alternative 2 (The Accelerated Construction Alternative) would have direct short-term, but not significant, impacts on air quality generated by construction of the proposed facilities. Similarly, operational emissions of the new facilities would not significantly impact short- or long-term regional air emission levels or air quality compliance with the NAAQS, and would not affect the Base's air permit status. Schriever AFB would remain below the 250 ton/year thresholds for PSD review requirements and would continue to be classified as a minor source for HAPs. Additionally, the Accelerated Construction Alternative would be exempt from further air conformity review based on proposed increase in CO emission levels for both construction (13.16 ton/year) and operational activities (3.51 ton/year) being well below the air conformity analysis threshold of 100 ton/year. **Appendix B** presents detailed calculations of all Alternative 2 air emissions.

Because implementation of the Accelerated Construction Alternative would not contribute to an exceedance of the NAAQS and would conform to the El Paso County maintenance plan for CO, the impacts would not be significant.

Emissions associated with this Alternative include the activities included under Alternative 1 (activity IDs 1 – 14 [**Table 1**]) plus additional activities (activity IDs 15-24 [**Table 2**]), and would be approximately double those described under Alternative 1 alone due to the larger total aerial coverage of all the projects and larger total building area as compared to Alternative 1 alone. However, the slightly higher impacts would still not be significant to regional emission levels and NAAQS compliance.

4.1.3.1 Construction Emissions

Construction activities associated with the proposed Alternative 2 facilities (i.e., through year 2015 plus those proposed from 2016 to 2021), as outlined in the Base General Plan, would generate emissions of criteria pollutants, HAPs, and GHGs from fuel combustion and fugitive dust associated with construction equipment, trucks, worker vehicles, grading, travel on paved and unpaved roads, asphalt plants, and surface coating. Estimated emissions for the construction phase are shown in **Table 12**. Criteria pollutants would be emitted 4.51 ton/year or less on an annual average basis during the 6-year project period, except for CO, which would be emitted at approximately 13.16 ton/year on an annual average basis. HAPs would be emitted at 0.12 ton/yr. The construction emissions would contribute 0.022 percent or less to the El Paso County criteria pollutant and HAP emissions and 0.012 percent or less to the San Isabel AQCR emissions. GHGs would be emitted at 1,194 ton/year on average.

Approximately 124 acres of soil would be disturbed during construction with a new building area of 894,700 square feet and road/parking improvements having an area of 367,500 square feet (see **Table 10**). Best management practices (such as application of water or chemical stabilizers to disturbed areas and revegetating sites) would be implemented to control fugitive dust. A Colorado APEN would be needed

for ground disturbances that exceed 25 acres and 6 months. The proposed Antenna Farm located outside the Restricted Area is the only project that would exceed the APEN acreage threshold, but it would not meet these thresholds, as it would be constructed incrementally over a number of years. Each increment would be a separate construction project, and would encompass less than 25 acres.

4.1.3.2 Operational Emissions

Operational activities would generate emissions from increased fuel consumption for space heating of the new building area, and fuel combustion in emergency generators.

It is estimated that four emergency generators would be installed to support proposed mission-critical operations. Other projects developed under the Alternative 2 are not anticipated to require generators. Emergency generators are subject to APEN requirements and Standards of Performance for New Stationary Sources (i.e., 40 CFR 63, Subpart ZZZZ – *National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*). The total estimated actual emissions from the new and existing stationary sources at the base would remain within permit limits. Estimated emissions for the Alternative 2 operational phase are shown in **Table 13** along with the combined emissions from the existing operations. Alternative 2 would increase Schriever AFB annual operational emissions by approximately 3.51 ton/year for CO (35 percent), 8.61 ton/year for NOx (55 percent), 0.34 ton/year or less for the other criteria pollutants (≤ 20 percent), and 0.05 ton/year for HAPs (8 percent). For Alternative 2, these additional operational emissions would not be noticeable in the Schriever AFB's percent contribution to the regional emissions (compare Table 13 with Table 5). Schriever AFB would remain at 0.135 percent or less of the El Paso County emissions and 0.072 percent or less of the San Isabel AQCR emissions. GHGs would be increased by 3,323 ton/year. A Colorado APEN may be needed for individual stationary emission units depending on the potential emission levels. This would be determined from the actual project design specifications.

4.1.4 Potential Impacts of Alternative 3 – No Action Alternative

Emissions of criteria pollutants and HAPs would remain the same under the No Action Alternative. There would be no impacts to air quality associated with Schriever AFB from the No Action Alternative.

4.2 Human Health and Safety

No significant direct or indirect impacts to human health and safety would be expected from construction and operation of facilities outlined in **Section 2** for either the Preferred Alternative (Alternative 1) or the Accelerated Construction Alternative (Alternative 2). Human health and safety would not be impacted under the No Action Alternative (Alternative 3).

4.2.1 Analysis Methods

If implementation of either of the Proposed Actions (Alternative 1 or Alternative 2) were to increase risks associated with the safety of construction personnel, contractors, military personnel, or the local community, or hinder the ability to respond to an emergency, it would represent an adverse effect. An effect would be significant if implementation of a Proposed Action were to substantially increase risks associated with the safety of construction personnel, contractors, military personnel, or the local community; substantially hinder the ability to respond to an emergency; or introduce a new health or

safety risk for which the installation is not prepared or does not have adequate management and response plans in place.

4.2.2 Potential Impacts of Alternative 1 – Preferred Alternative

The potential for direct short-term, adverse effects on safety would increase slightly from construction of the facilities and associated extension/improvement of existing infrastructure included in the Preferred Alternative (Alternative 1; see **Section 2.1**); no long-term direct or indirect safety impacts from operation would be expected.

4.2.2.1 Contractor Safety

Construction of projects outlined in **Section 2.1** for the Preferred Alternative would increase the health and safety risk to contractors performing construction work at the project sites during the normal work day because the level of such activity would increase. However, contractors would be required to establish, implement, and maintain health and safety programs for their employees. Potential effects from the generation of fugitive dust would be mitigated by the application of water for dust suppression. Therefore, while construction activities at Schriever AFB would potentially result in effects on contractor safety, direct adverse impacts would be expected to be negligible due to the implementation of effective health and safety programs. Indirect impacts would not be expected. No adverse impacts on contractor safety from the operation of constructed facilities would be anticipated.

4.2.2.2 Military Personnel Safety

Construction of projects outlined in **Section 2.1** for the Preferred Alternative would occur on land used by installation personnel. Any military personnel working at the construction site would be required to follow established health and safety plans for the construction site. Construction activities at Schriever AFB would potentially result in effects on military personnel safety; however, these adverse impacts would be expected to be negligible due to the implementation of effective health and safety programs. No direct or indirect adverse impacts on military personnel safety from the operation of constructed facilities would be anticipated.

4.2.2.3 Public Safety

Public health and safety would not be adversely affected by the construction and operation of projects outlined in **Section 2.1** for the Preferred Alternative, as public entry to the installation is restricted. Members of the public visiting the site on official business, such as government officials, would be accompanied by USAF personnel and would be required to follow established health and safety plans for the construction site. Construction activities would not pose a safety risk to the public or to off-installation areas. Work areas surrounding construction sites would be fenced and appropriate signs posted to further reduce safety risks to other installation personnel and the public. Therefore, no direct or indirect impacts on public health and safety would be anticipated from construction and operation of facilities included in the Preferred Alternative.

4.2.2.4 Explosives and Munitions Safety

Currently, there are no munitions stored or handled at Schriever AFB; therefore, no impacts on explosives and munitions safety would be anticipated from implementation of the Preferred Alternative.

4.2.3 Potential Impacts of Alternative 2 – Accelerated Construction

Direct and indirect impacts on health and safety resulting from constructing and operating the facilities outlined for the Accelerated Construction Alternative (Alternative 2; see **Section 2.2**) would be similar to those described for Alternative 1 (discussed in **Section 4.2.2**). No negative effects on health and safety would be expected from construction and operation facilities and associated infrastructure; no long-term safety impacts would be expected. Impacts on contractor safety, military personnel safety, and public safety would be similar to those described for Alternative 1.

4.2.4 Potential Impacts of Alternative 3 – No Action Alternative

The No Action Alternative would result in continuation of the existing safety conditions at Schriever AFB, as discussed in **Section 3.2.5**. No direct or indirect impacts to human health and safety would be expected from the implementation of the No Action Alternative.

4.3 Noise

No significant direct or indirect, short- or long-term impacts on the noise environment would be expected from construction and operation of facilities outlined in **Section 2** for either the Preferred Alternative (Alternative 1) or the Accelerated Construction Alternative (Alternative 2). The noise environment would not be impacted under the No Action Alternative (Alternative 3).

Analysis methods and a detailed description of potential impacts of each alternative are given below.

4.3.1 Analysis Methods

Noise impact analyses typically evaluate potential changes to the existing noise environment that would result from implementation of a proposed action. Potential changes in the acoustical environment can be beneficial (i.e., if they reduce the number of sensitive receptors exposed to unacceptable noise levels or reduce the ambient sound level), negligible (i.e., if the total number of sensitive receptors to unacceptable noise levels is essentially unchanged), or adverse (i.e., if they result in increased sound exposure to unacceptable noise levels or ultimately increase the ambient sound level).

Projected noise effects were evaluated qualitatively for the alternatives considered. The analysis of noise impacts was based on estimated noise levels generated from the Proposed Action and No Action Alternatives and a comparison with noise levels that prevent hearing loss and cause activity interference or annoyance.

4.3.2 Potential Impacts of Alternative 1 – Preferred Alternative

Construction activities generate noise by their very nature and are highly variable, depending on the type, number, and operating schedules of equipment. Construction projects are usually executed in stages, each having its own combination of equipment and noise characteristics and magnitudes. Construction activities associated with the Preferred Alternative (Alternative 1) would include mobilization, site preparation, excavation, placing foundations, utility development, heavy equipment movement, and paving roadways and parking areas. The most prevalent noise source at typical construction sites is the internal combustion engine. General construction equipment using engines includes, but is not limited to: heavy, medium, and light equipment such as excavators; roller compactors; front-end loaders; bulldozers;

graders; backhoes; dump trucks; water trucks; concrete trucks; pump trucks; utility trucks; cranes; sheet pile drivers; man lifts; forklifts; and lube, oil, and fuel trucks.

Overall, noise would increase in the proposed development locations for the Preferred Alternative. The addition of various facilities would increase long-term noise levels on the Base; however, noise increases are not expected to cause disruption to current area occupants or activities. Overall, the addition of mission, support, industrial, training, community commercial, outdoor recreation, and other facilities would increase the volume of traffic in areas that are currently unoccupied. As a result, noise created by area traffic would increase slightly in the Schriever AFB area.

Construction activity would occur intermittently several months at a time for several years at various locations on Base. During construction activities, noise would increase due to operation of heavy equipment, increases in traffic from waste hauling activities, and other construction related sources. These noises would be short-term, ceasing to continue after construction activities are completed. Construction would primarily occur over the course of a daytime shift, although it is possible that extensions of the basic workday, or moderate amounts of evening or weekend work would occur. However, increases in ambient noise associated with construction activities would typically take place only during weekday daytime hours. There would be little, if any, construction noise at night.

Given the types of equipment likely to be used in constructing the roads and facilities (bulldozers, dump trucks, and similar equipment) and the noise levels of the equipment, typical noise emissions at 50 feet from multiple pieces of construction equipment would be approximately 90 dBA (U.S. Army 1978). Assuming a usage factor of 50 percent (on average, any piece of equipment would be used at a maximum operating capacity 50 percent of the time), noise averaged over 8 hours would be about 88.5 dBA at 50 feet; noise averaged over 24 hours would be about 82 dBA at 50 feet. Noise exposure levels would attenuate about 6 dB for every doubling of distance (assuming flat terrain and no trees or buildings). Therefore, construction noise could cause temporary annoyance to current area occupants outdoors within 1,600 feet of construction. The threshold for annoyance as a result of outdoor exposure of 55 $L_{eq\ (24)}$ could be exceeded within 1,600 feet. Within buildings, the noise levels would be attenuated by an additional 20 to 25 dBA and therefore annoyance to those indoors is only predicted within 50 to 100 feet of construction activity.

Peak noise levels vary at a given location based on line of sight, topography, vegetation, and atmospheric conditions. In addition, peak noise levels would be variable and intermittent because each piece of equipment would only be operated when needed. However, peak construction noise levels would be considerably higher than current noise levels. Relatively high peak noise levels in the range of 93-108 dBA would occur on the active construction site, decreasing with distance from the construction areas. **Table 14** presents peak noise levels from a range of construction equipment during proposed construction activities.

Table 14. Peak noise levels expected from typical construction equipment.

Source	Peak Noise Level (dBA, attenuated)							
	Distance from Source (feet)							
	0	**50**	**100**	**200**	**400**	**1,000**	**1,700**	**2,500**
Heavy Truck	95	84-89	78-93	72-77	66-71	58-63	54-59	50-55
Dump Truck	108	88	82	76	70	62	58	54
Concrete Mixer	108	85	79	73	67	59	55	51
Jack-hammer	108	88	82	76	70	62	58	54
Scraper	93	80-89	74-82	68-77	60-71	54-63	50-59	46-55
Bulldozer	107	87-102	81-96	75-90	69-84	61-76	57-72	53-68
Generator	96	76	70	64	58	50	46	42
Crane	104	75-88	69-82	63-76	55-70	49-62	45-48	41-54
Loader	104	73-86	67-80	61-74	55-68	47-60	43-56	39-52
Grader	108	88-91	82-85	76-79	70-73	62-65	58-61	54-57
Pile driver	105	95	89	83	77	69	65	61
Forklift	100	95	89	83	77	69	65	61

Worst-Case Combined Peak Noise Level (Bulldozer, Jackhammer, Scraper)					
Distance from Source (feet)	50	100	200	¼ Mile	½ Mile
Combined Peak Noise Level (dBA)	103	97	91	74	68

Source: Tipler 1976

Generally speaking, peak noise levels within 50 feet of active construction areas and material transportation routes would most likely be considered "striking" or "very loud," comparable to peak crowd noise at an indoor sports arena. At approximately 200 feet, peak noise levels would be loud - approximately comparable to a garbage disposal or vacuum cleaner at 10 feet. At 0.25 mile, construction noise levels would generally be quiet enough to be considered insignificant, although transient noise levels may be noticeable at times.

The average individual is likely to tolerate noise associated with construction, given its temporary nature, and that the majority of construction would take place during daytime hours, (i.e., when acceptance towards noise is higher, and the risk of sleep disturbance and interference with relaxation activities is low). While construction noise would be discernable at some locations, it is not expected to increase ambient noise levels significantly for any appreciable period, and would have a minor effect on the nearest noise- sensitive receptors.

The construction contractor would ensure that Air Force personnel are protected from excessive noise exposure by utilizing barriers to prevent unauthorized access to high noise areas. Occupational noise exposure to workers would be kept below the OSHA standard of 90 $L_{eq\,(8)}$, averaged over eight hours.

4.3.3 Potential Impacts of Alternative 2 – Accelerated Construction

The short- and long-term increase in noise associated with construction and operation of additional facilities and traffic would be similar for Alternative 2, causing temporary annoyance during construction to nearby Base personnel, but no risk or long-term disruption of routine activities.

4.3.4 Potential Impacts of Alternative 3 – No Action Alternative

Noise levels would remain at current levels and no impacts would occur from the No Action Alternative.

4.4 Land Use and Visual Resources

No significant direct or indirect impacts on land use and visual resources would be expected from construction and operation of facilities outlined in **Section 2** for either the Preferred Alternative (Alternative 1) or the Accelerated Construction Alternative (Alternative 2). Land use and visual resources would not be impacted under the No Action Alternative (Alternative 3).

Evaluation criteria for land use and visual resources are outlined below.

4.4.1 Analysis Methods

4.4.1.1 Land Use

The significance of potential land use impacts is based on the level of land use sensitivity in areas affected by a proposed action and the compatibility of a proposed action with existing conditions. In general, a land use impact would be significant if the Proposed Action were to cause any of the following:

- Be inconsistent or in noncompliance with existing land use plans or policies;
- Preclude the viability of existing land use;
- Preclude continued use or occupation of an area;
- Be incompatible with adjacent land use to the extent that public health or safety is threatened; or
- Conflict with planning criteria established to ensure the safety and protection of human life and property.

4.4.1.2 Visual Resources

The significance of potential impacts on visual resources is based on the level of visual sensitivity in the area. Visual sensitivity is defined as the degree of public interest in a visual resource and concern over adverse changes in the quality of that resource. In general, an impact on a visual resource is adverse if implementation of a proposed action were to result in substantial alteration to an existing sensitive visual setting. Potential impacts might depend on a variety of factors such as the following:

- Adversely influence a national, state, or local park or recreation area;
- Degrade or diminish a Federal, state, or local scenic resource; and
- Create adverse visual intrusions or visual contrasts affecting the quality of a landscape.

4.4.2 Potential Impacts of Alternative 1 – Preferred Alternative Action

Projects proposed for the Preferred Alternative would be consistent with zoning designations on Schriever AFB and in the surrounding off-installation area. In addition, the Preferred Alternative would not violate local zoning ordinances because municipal zoning regulations do not apply to Federal property. Therefore, the Preferred Alternative would not result in any significant impacts on municipal land use plans or policies.

The Preferred Alternative would not preclude the viability of existing on-installation and off-installation land uses, or continued use and occupation of areas either on Schriever AFB or in off-installation areas. Therefore, the Preferred Alternative would not result in significant direct or indirect impacts on existing land use viability or continued land occupation.

4.4.3 Potential Impacts of Alternative 2 – Accelerated Construction

Implementation of Alternative 2 would be consistent with zoning designations on Schriever AFB and in the surrounding off-installation area. In addition, this alternative would not violate local zoning ordinances because municipal zoning regulations do not apply to Federal property. Therefore, the implementation of Alternative 2 would not result in any significant impacts on municipal land use plans or policies.

The Accelerated Construction Alternative would not preclude the viability of existing on-installation and off-installation land uses, or continued use and occupation of areas either on Schriever AFB or in off-installation areas. Therefore, it would not result in significant direct or indirect impacts on existing land use viability or continued land occupation.

4.4.4 Potential Impacts of Alternative 3 – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and existing land use conditions would remain the same as discussed in **Section 3.2.7.** In addition, no changes to the existing visual environment would occur. Therefore, no direct or indirect impacts on land use or visual resources would be anticipated.

4.5 Geologic Resources

The Preferred Alternative (Alternative 1) would disturb approximately 26 acres of soil over the next five years. Under the Accelerated Construction Alternative (Alternative 2), approximately 123.6 additional acres would be disturbed over the next five years. Potential direct or indirect impacts to geologic resources would not be significant for either Alternative 1 or 2. Geologic resources would not be impacted under the No Action Alternative (Alternative 3).

Analysis methods and a description of potential impacts to geologic resources (including soils and topography) for each alternative are provided below.

4.5.1 Analysis Methods

Protection of unique geological features, minimization of soil erosion, and the siting of facilities in relation to potential geologic hazards are considered when evaluating potential effects of a proposed action on geological resources. Generally, adverse effects can be avoided or minimized if proper construction techniques, erosion-control measures, and structural engineering design are incorporated into project development. Effects on geology and soils would be significant if any of the following occur:

- Alteration of the lithology, stratigraphy, and geological structures that control groundwater quality;
- Alteration of the distribution of aquifers and confining beds, and groundwater availability; and
- Change the soil composition, structure, or function (including prime farmland and other unique soils) within the environment.

The geologic resources within the proposed project area were studied to determine the potential impacts from implementing any of the three alternatives. Geologic studies, the soil survey and geodatabase for the El Paso County area, previous EAs, topographic contours from Schriever AFB, and USGS topographical maps were reviewed to characterize the existing environment. Construction activities that could influence geologic resources were evaluated to predict the type and magnitude of potential impacts. For example, grading, excavating, and compaction would disturb soils during construction activities. The predicted post construction environment was compared to the existing environment and the change was evaluated to determine if significant changes in any existing conditions would occur.

4.5.2 Potential Impacts of Alternative 1 – Preferred Alternative

All Preferred Alternative activities would occur within the Base boundaries. Implementation of the Preferred Alternative (Alternative 1) would result in the disturbance of an estimated 26.0 acres. Approximately 3.5 acres would be disturbed for construction of the facilities located in the Community Center ADP; 8.9 acres for facilities outside the RA; 1.4 acres for facilities within the RA; and 12.2 acres for road/vehicle parking improvements over all areas (**Table 15**). Additionally, installation of utilities would temporarily disturb a total of about 3,000 linear feet. Utilities would be collocated with roads whenever practicable. Assuming that a 10-foot wide corridor is disturbed, approximately 0.7 acres would be temporarily impacted during the installation of utilities.

Grading, excavation, and compaction from equipment would disturb approximately 24.4 acres of Ascalon soils, 0.7 acres of Blendon soils, and 0.9 acres of Truckton soils during construction of the proposed facilities **(Table 16)**. Excavations for buildings could be as deep as 15 to 20 feet. Elevations in the affected areas range from about 6,195 feet to 6,320 feet. Slopes of affected areas are between 1 and 9 percent. Stormwater drainage would be maintained and impacts to topography would not be significant.

Table 15. Soils affected by the Preferred Alternative (Alternative 1) by area and proposed components.

Area	Proposed Component	Soil ID	Soil Description/Slope	Area (square feet)	Acres
Community Center ADP	**SFS Operation Facility**	2	Ascalon sandy loam, 1-3%	21,400	0.5
		3	Ascalon sandy loam, 3-9%	28,800	0.7
	Addition to Fitness Center	3	Ascalon sandy loam, 3-9%	34,000	0.8
	Car Wash	2	Ascalon sandy loam, 1-3%	2,400	0.1
	Roller Hockey field	2	Ascalon sandy loam, 1-3%	19,600	0.4
	Youth Center	97	Truckton sandy loam, 3-9%	14,400	0.3
	Airman & Family Readiness Center/Chapel	2	Ascalon sandy loam, 1-3%	31,600	0.7
			Total:	**152,200**	**3.5**
Outside the RA (Non-ADP)	**Electrical Substation**	3	Ascalon sandy loam, 3-9%	6,000	0.1
	Enoch/Irwin Road Improved Intersection	-	-	NA	NA
	25 SCTS Maintenance Facility	3	Ascalon sandy loam, 3-9%	151,300	3.5
		2	Ascalon sandy loam, 1-3%	152,300	3.5
	Military Gas Station	3	Ascalon sandy loam, 3-9%	43,300	1.0
		2	Ascalon sandy loam, 1-3%	5,100	0.1
	Consolidated SFS Training Facility	3	Ascalon sandy loam, 3-9%	32,400	0.7
			Total:	**390,400**	**8.9**
Inside the RA (Non-ADP)	**Weather Station**	-	-	12	0
	NOG/NRO Building	2	Ascalon sandy loam, 1-3%	19,800	0.5
		97	Truckton sandy loam, 3-9%	9,300	0.2
	Administrative Building	3	Ascalon sandy loam, 3-9%	29,000	0.7
			Total:	**58,100**	**1.4**
All	**Road/Parking Improvement**	2	Ascalon sandy loam, 1-3%	**163,600**	**3.7**
		3	Ascalon sandy loam, 3-9%	**321,300**	**7.4**
		10	Blendon sandy loam, 0-3%	**30,300**	**0.7**
		97	Truckton sandy loam, 3-9%	**16,000**	**0.4**
			Total:	**531,200**	**12.2**
TOTAL:				**1,131,900**	**26.0**

Notes: The proposed footprint measurements were increased by 20 percent to account for construction disturbance. Soil disturbance information for the sidewalk and bike bath expansion is not included, as the locations for these proposed components has not yet been determined.

Table 16. Summary of soils affected by the Preferred Alternative (Alternative 1).

Map Symbol	Description	Acreage	Percent of Total Soil Type (Base-wide)
2	Ascalon sandy loam, 1-3% slope	9.5	1.4
3	Ascalon sandy loam, 3-9% slope	14.9	0.1
10	Blendon sandy loam, 0-3% slope	0.7	1.4
97	Truckton sandy loam, 3-9% slope	0.9	0.3
	TOTAL	**26.0**	-

Disturbance of these soils during construction activities would expose the soil to potential erosion by wind and water. If the soil was left disturbed for extended periods of time, erosion could be substantial, as most of these soils have a moderate risk of erosion by wind and water. Due to the limited area impacted and the length of construction, impacts to soils would not be significant. BMPs (such as daily watering as needed, chemical stabilization, maintaining existing vegetation as much as possible, and revegetating sites as soon as possible) would be implemented to reduce the risk of soil erosion.

Engineering studies would be conducted to determine the suitability of the soils to support construction of the proposed infrastructure. As discussed in **Section 3.2.8**, the Soil Survey for El Paso County indicates that there are moderate limits for construction due to a moderate shrink-swell potential, frost action, low strength of soils, and slope. A combination of design and soil modification (changing physical properties, such as soil texture) can be used to overcome these limits. Therefore, impacts to soils from construction activities associated with Alternative 1 are not anticipated to be significant.

As discussed in **Section 3.2.8** there are no major faults within the project area. The area is located in Zone 1 for potential earthquake damage with slight damage anticipated from any seismic event. No special design would be required. Impacts from seismicity would not be significant.

In summary, direct impacts to geologic resources would not be significant under the Preferred Alternative scenario. Short-term, minor, adverse, and long-term, negligible effects on soils would be anticipated from implementation of the Alternative 1. Potential indirect impacts were not identified. Long-term soil productivity in affected areas would not be significantly impacted. The topography at the site would undergo minor changes, but impacts would not be significant. BMPs would be implemented to minimize the effects of construction on geology and soils. In accordance with permit requirements and BMPs, topsoil would be restored and vegetation would be reestablished to reduce the potential for erosion and to maintain soil productivity. Once construction activities have ceased and vegetation has been reestablished, long-term effects would be expected to be negligible.

4.5.3 Potential Impacts of Alternative 2 – Accelerated Construction

The Accelerated Construction Alternative (Alternative 2) would include projects proposed under the Preferred Alternative (Alternative 1) and additional projects currently scheduled for 6 to 10 years out. All activities for Alternative 2 would also occur within Base boundaries. An estimated 123.6 additional acres (i.e. in addition to the 26 acres under Alternative 1) would be affected by implementation of Alternative 2.

Approximately 0.6 acres would be disturbed for construction of additional facilities located in the Community Center ADP; 0.5 acres for additional facilities in the West Campus ADP; 108.9 acres for facilities outside the RA; 3.5 acres for facilities within the RA; and 10.1 acres for road/vehicle parking improvements throughout the Base (**Table 17**). In addition, installation of utilities would temporarily disturb a total of about 4,000 linear feet. Utilities would be collocated with roads whenever practicable. Assuming a 10-foot wide corridor is disturbed, approximately 0.9 acres would be temporarily impacted for this purpose.

Table 17. Additional soils affected by Accelerated Construction (Alternative 2) by area and proposed component.

Area	Proposed Component	Soil ID	Soil Description	Area (square feet)	Acres
Community Center ADP	**Education Center/Library**	2	Ascalon sandy loam, 1-3%	5,700	0.1
		3	Ascalon sandy loam, 3-9%	3,100	0.1
	Fire Station	3	Ascalon sandy loam, 3-9%	19,100	0.4
			Total:	**27,900**	**0.6**
West Campus ADP	**Dining Facility (Burger King)**	2	Ascalon sandy loam, 1-3%	2,900	0.1
	Services Mall	2	Ascalon sandy loam, 1-3%	15,900	0.4
			Total:	**18,800**	**0.5**
Outside the RA (Non-ADP)	**Civil Engineer Complex**	3	Ascalon sandy loam, 3-9%	603,300	13.9
		2	Ascalon sandy loam, 1-3%	38,700	0.9
	Transportation Complex	3	Ascalon sandy loam, 3-9%	89,300	2.1
		2	Ascalon sandy loam, 1-3%	97,100	2.2
	Addition to Medical/Dental Clinic	2	Ascalon sandy loam, 1-3%	14,400	0.3
		3	Ascalon sandy loam, 3-9%	4,300	0.1
	OPS Administrative Facility	3	Ascalon sandy loam, 3-9%	29,200	0.7
	Antenna Farm	12	Bresser sandy loam, 3-5%	2,860,800	65.7
		3	Ascalon sandy loam, 3-9%	280,500	6.4
		2	Ascalon sandy loam, 1-3%	722,200	16.6
			Total:	**4,739,800**	**108.9**
Inside the RA (Non-ADP)	**Two Future RA Mission Buildings**	3	Ascalon sandy loam, 3-9%	94,500	2.2
		2	Ascalon sandy loam, 1-3%	56,000	1.3
			Total:	**150,500**	**3.5**
All	**Road/Parking Improvement**	2	Ascalon sandy loam, 1-3%	361,700	8.3
		3	Ascalon sandy loam, 3-9%	79,300	1.8
			Total:	**441,000**	**10.1**
TOTAL:				**5,378,000**	**123.6**
Note: The proposed footprint measurements were increased by 20 percent to account for construction disturbance.					

Approximately 57.9 acres of Ascalon soils and 65.7 acres of Bresser soils would be disturbed by grading, excavation, and compaction from equipment during construction of the proposed facilities **(Table 18)**. Excavations for buildings could be as deep as 15 to 20 feet. Elevations in the affected areas range from about 6,145 to 6,325 feet. Slopes of affected areas are between 1 and 9 percent. Stormwater drainage would be maintained and impacts to topography would not be significant.

Table 18. Summary of Additional Soils Affected by Accelerated Construction (Alternative 2).

Map Symbol	Description	Acreage	Percent of Total Soil Type (Base-wide)
2	Ascalon sandy loam, 1-3% slope	30.2	4.7
3	Ascalon sandy loam, 3-9% slope	27.7	1.7
12	Bresser sandy loam, 3-5% slope	65.7	11.9
	TOTAL	**123.6**	-

Disturbance of these soils during construction activities would expose the soil to potential erosion by wind and water. If the soil was left disturbed for extended periods of time, erosion could be substantial, as most of these soils have a moderate risk of erosion by wind and water. Due to the limited area impacted and the length of construction, impacts to soils would not be significant. BMPs (such as daily watering as needed, chemical stabilization, maintaining existing vegetation as much as possible, and revegetating sites as soon as possible) would be implemented to reduce the risk of wind erosion.

Engineering studies would be conducted to determine the suitability of the soils to support construction of the proposed infrastructure. As discussed in **Section 3.2.8**, the Soil Survey for El Paso County indicates that there are moderate limits for construction due to a moderate shrink-swell potential, frost action, low strength of soils, and slope. A combination of design and soil modification (changing physical properties, such as soil texture) can be used to overcome these limits. Impacts to soils from construction would not be significant.

Impacts to geologic resources would not be significant. In accordance with permit requirements and BMPs, topsoil would be restored and vegetation would be reestablished to reduce the potential for erosion.

In summary, direct short-term, minor, adverse, and long-term, negligible effects on soils would be anticipated from implementation of Alternative 2. Long-term soil productivity in affected areas would not be significantly impacted. Topsoil would be restored to disturbed areas and vegetation would be reestablished, maintaining soil productivity. The topography at the site would undergo minor changes, but impacts would not be significant. BMPs would be implemented to minimize the effects of construction on geology and soils. Once construction activities have ceased and vegetation has been reestablished, long-term effects would be expected to be negligible. Potential indirect impacts to geologic resources were not identified.

4.5.4 Potential Impacts of Alternative 3 – No Action Alternative

No construction would occur under the No Action Alternative; therefore, geologic resources would not be affected.

4.6 Water Resources

In summary, constructing the proposed facilities under either the Preferred Alternative (Alternative 1) or the Accelerated Construction Alternative (Alternative 2) would not disturb the unconfined surficial aquifer. Similarly, potential impacts to surface water, floodplains and wetlands would not be significant for either Alternative 1 or 2. There would be no impact to water resources from the No Action Alternative (Alternative 3).

Analysis methods and a detailed description of potential impacts to water resources (groundwater, surface water, floodplains and wetlands) of each alternative are given below.

4.6.1 Analysis Methods

Evaluation of water resources examines the quantity and quality of the resource and its demand for various purposes. Evaluation of potential impacts of the alternatives on water resources is based on surface and subsurface water availability, quality, and use; existence of floodplains; existence of wetlands; and associated regulations. An impact would be significant if it were to substantially affect water quality; substantially reduce water availability or supply to existing users; threaten or damage hydrologic characteristics; or violate established Federal, state, or local laws and regulations. The potential impact of flood hazards on a proposed action is important if such an action occurs in an area with a high probability of flooding.

To establish potential impacts of the proposed alternatives, documents on the hydrology and hydrogeology of the area were reviewed. Maps showing hydrography, topography, and Base drainage were examined. FEMA FIRMs were reviewed to identify floodplains on and near the Base. Recent wetland evaluations were used to identify wetland areas in proximity to proposed project sites. The assessment of potential impacts to water resources focused on the potential for impacting groundwater, surface water, floodplains and wetlands.

4.6.2 Potential Impacts of Alternative 1 – Preferred Alternative

4.6.2.1 Groundwater

Approximately 26 acres would be graded for construction of proposed facilities under the Preferred Alternative. An area of alluvial sediments (primarily sand and gravel) would be impacted. The unconfined alluvial aquifer, located at depths of 25 to 100 feet, would not be directly impacted. Disturbance from the excavation would be short term, and impacts would not be significant.

Short-term, minor, adverse effects on water resources could be expected in the event of a release of fuels, lubricants, hydraulic fluids, or other hazardous materials onto the ground from a leak or spill. Proper housekeeping, maintenance of equipment, and containment of fuels and other potentially hazardous materials would be conducted to minimize the potential for a release of fluids into groundwater. In the event of a spill, procedures will be implemented to quickly contain and clean up the affected area.

Construction of the proposed facilities under the Preferred Alternative would potentially result in a negligible indirect impact by increasing impermeable surfaces by a maximum of approximately 26 acres (likely less), slightly decreasing the recharge area of the unconfined surficial aquifer. However, adherence to Section 438 of the EISA would result in the retention of the 95th percentile rainfall onsite, thus maximizing infiltration of stormwater runoff from proposed facilities and minimizing aquifer recharge loss. Therefore, implementation of the Preferred Alternative would negligibly impact aquifer recharge and impacts to the aquifer system would not be significant. The Preferred Alternative would not impact wells used to provide water for stock and domestic uses in the vicinity of the Base.

4.6.2.2 Surface Water

Construction of facilities associated with the Preferred Alternative would avoid impacts to ephemeral drainage areas, floodplains, or wetlands and would conform to all required stormwater management plans and design requirements discussed in **Section 3.2.9**. Construction of additional impermeable surfaces would slightly increase the amount and potential velocity of stormwater runoff. However, impacts to the existing stormwater system from implementation of the Preferred Alternative would not be significant assuming an adequately designed stormwater management system is properly implemented in association with the proposed facilities and in accordance with BMPs outlined in the SWPP. The stormwater management system would include design features to prevent an increase in sediment yield and flow velocity, volume, duration and temperature from preconstruction conditions, in accordance with Section 438 of the EISA. These design features could include Green Infrastructure/Low-Impact Development Management Tools, such as:

- Rain gardens, bioretention, and infiltration planters,
- Porous pavement,
- Vegetative swales and bioswales,
- Green roofs,
- Pocket wetlands,
- Revegetation using native plants,
- Protection and enhancement of riparian buffers, and
- Rainwater harvesting for reuse.

Disturbed areas would be vulnerable to wind and water erosion during grading of the site and construction. Particulate matter would be transported and deposited by wind in the local area. Deposition of particulate matter and siltation of streams would not be significant due to the dispersive wind conditions and small amounts of particulate matter that would be generated by the construction activities. Soil disturbed during construction would be watered as needed to control wind erosion.

Implementing appropriate BMPs would minimize water erosion. These BMPs would be properly selected, designed, installed and maintained to prevent an increase in sediment yield and flow velocity

from preconstruction conditions. This would include such practices as installing and maintaining silt fences near drainage channels, limiting the area disturbed to the extent practical, installing a sediment basin as needed, and stabilizing soil as soon as practical. Native vegetation would be reestablished as soon as practical after construction of the facilities. Impacts to water quality from construction would be minimal, temporary, and would not be significant. Post-construction impacts to water quality would be minimal and would not be significant. Any potential indirect effects to water quality would be negligible with proper BMP implementation.

4.6.2.3 Floodplains

The nearest proposed construction site to the one mapped floodplain area on the installation is situated 1.5 miles to the southwest. Indirect, long-term, negligible, adverse effects on the floodplains situated downstream along the West Fork of Black Squirrel Creek could occur from an increase in volume of stormwater reaching this floodplain due to increased impervious surfaces within the projected area. However, all development would incorporate effective stormwater management practices, including design measures to reduce the volume and velocity of flow before discharge to any nearby drainage.

4.6.2.4 Wetlands

No construction is proposed within or near any wetland area at Schriever AFB. Therefore, no direct or indirect impacts to wetlands on the Base are anticipated to result from the Preferred Alternative.

In summary, no significant direct or indirect impacts to water resources would occur as a result of the Preferred Alternative.

4.6.3 Potential Impacts of Alternative 2 – Accelerated Construction

Impacts on water resources associated with Alternative 2 (Accelerated Construction) would be similar to those of the Preferred Alternative. An estimated 124 acres would be graded for construction of proposed facilities for Alternative 2, in addition to the 26 acres for Alternative 1. Construction of the proposed facilities under the Accelerated Construction Alternative would increase impermeable surfaces by an additional maximum of approximately 45 acres (assuming the Antenna Farm impervious area is a maximum of 20 percent of the estimated area affected by soil disturbance), slightly decreasing the recharge area of the unconfined surficial aquifer.

Although construction would occur on a shorter schedule under Alternative 2, and would encompass larger areas, BMPs would minimize any potential for groundwater, surface water, floodplain, or wetland impacts from stormwater runoff, erosion, or siltation. Although the area of impermeable surface on the Base would increase in the 1- to 5-year time frame, compared to the increase associated with the Preferred Alternative, potential impacts would remain negligible as a result of a small relative area of the aquifers that would be affected and the inclusion of adequate stormwater management systems as detailed in **Section 4.6.2.2.**

4.6.4 Potential Impacts of Alternative 3 – No Action Alternative

Under the No Action Alternative, there would be no impact to groundwater, surface water, floodplains, or wetlands, since no construction would occur.

4.7 Biological Resources

No populations of wildlife species or threatened, endangered, or sensitive species or critical habitat would be affected by the Preferred Alternative (Alternative 1). Furthermore, with the incorporation of appropriate BMPs, no increases in noxious weed populations would be expected. Therefore, direct or indirect impacts to biological resources would not be significant for Alternative 1. Potential impacts to biological resources from the Accelerated Construction Alternative (Alternative 2) would be similar to those described under the Alternative 1. Under the No Action Alternative (Alternative 3), there would be no change in the biological environment of the project area.

4.7.1 Analysis Methods

The analysis of environmental consequences to vegetation and wildlife includes a discussion of the intensity, duration, and type of impact. Intensity of impact describes the degree, level, or strength of an impact as negligible, minor, moderate, or major. Duration of impact considers whether the impact would occur over the short term or long term. Unless otherwise noted, short-term impacts are those that, within a short period of time, generally less than 5 years, would no longer be detectable as the resource or value returns to its pre-disturbance condition or appearance. Long-term impacts refer to a change in resources or value that is expected to persist for 5 or more years. The type of impact refers to whether the impact on the resource or value would be beneficial (positive) or adverse (negative).

Biological resources were evaluated in terms of compliance with Section 7 of the ESA, and related laws and authorities. Emphasis was placed on species with legal, commercial, recreation, ecological, or scientific importance. Biological resources might be affected directly by ground disturbance or indirectly through such changes as increased construction noise. A habitat perspective is used to provide a framework for analysis of general classes of impacts on biological resources (i.e., removal of critical habitat, noise, human disturbance).

Impacts on biological resources were further assessed by evaluating the following:

- Potential for loss or alteration of suitable habitat and the proximity of similar habitat,
- The proportion of the resource that would be affected relative to its occurrence in the region,
- The sensitivity of the resource to proposed activities, and
- The duration of ecological impacts.

The assessment of potential impacts to biological resources focused on the proposed location of the facilities and the existing habitat in these areas. Relevant plans and reports were reviewed, along with past NEPA documents, to provide data on existing biological resources in the project area.

4.7.2 Potential Impacts of Alternative 1 – Preferred Alternative

Potential impacts to vegetation, wildlife, and threatened, endangered, and sensitive species from implementation of the Preferred Alternative are discussed in the following sections.

4.7.2.1 Vegetation

The existing vegetation on the areas proposed for development under Alternative 1 mainly consists of shortgrass prairie, much of which has been historically altered by grazing. The plains ragweed (a globally rare species) does not occur within or in proximity to the areas proposed for development under the Preferred Alternative. Similarly, Schriever AFB's playas/wetland communities are not within the areas planned for development under the Preferred Alternative.

Under the Preferred Alternative, native vegetation would be largely removed on approximately 26 of the Base's 3,840 acres within the next five years, thus affecting less than 0.7% of the Base's land area. Native vegetation would be replaced with surfaces consistent with office buildings and community developments: landscape/bedding plants, ornamental shrubs, buildings and related structures, parking areas, and paved roads and walkways. To protect developed areas from the potential hazard of grassland fire in adjacent undeveloped areas, Schriever AFB would develop and maintain defensible space and suppress grassland fires around new development in accordance with the Base's Wildland Fire Management Plan (USAF 2005c), a component plan of the INRMP (USAF 2008).

Schriever AFB's Invasive Species Control Plan (a component of the 2008 INRMP) provides species-specific operational direction for managing noxious and invasive plant species on the Base (USAF 2005d). Construction in areas of native vegetation often creates an opportunity for undesired plants to invade the disturbed area. The potential for this adverse impact can be completely or largely negated by strict adherence to the Invasive Species Control Plan, including careful monitoring and aggressive control of invasive, and reseeding disturbed sites with competitive and native species.

Considering the minimal land area that would be impacted (0.7 percent of the total), that sensitive species and habitats (wetlands) would be avoided, and that proposed development would occur in accordance with the necessary control measures for wildfire and invasive species, potential direct and indirect impacts to vegetation from implementation of the Preferred Alternative would not have a significant effect.

4.7.2.2 Wildlife

Local wildlife tend to avoid the human and mechanical activity associated with construction in any area, and most would relocate to nearby undisturbed areas. Informal consultation and/or coordination between Schriever AFB, the USFWS, and the CDOW regarding the western burrowing owl and the black-tailed prairie dog will continue. Schriever AFB has a black-tailed prairie dog management plan (Young 2005), and any required relocation or depredation would be conducted in accordance with that plan.

Migratory Bird Species, including the burrowing owl, could be found in the project area. Area disturbance activities would need to be scheduled so as not to interfere with the nesting season of the western burrowing owl (approximately 1 April through 31 October). The Migratory Bird Treaty Act of 1918 (16 USC 703-712) as amended, and EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, requires Federal Agencies to minimize or avoid impacts on migratory birds listed in 50 CFR 10.13. If design and implementation of a Federal action cannot avoid measurable negative impact on migratory birds, EO 13186 requires the responsible agency to consult with the USFWS and obtain a Migratory Bird Depredation Permit. The following BMPs are recommended for reduction or avoidance of impacts to migratory birds:

Any groundbreaking construction activities should be performed before migratory birds return to the site (approximately March 15) or after all young have fledged (approximately July 31) to avoid incidental take.

- If construction is scheduled to start during the period in which migratory bird species are present, steps should be taken to prevent migratory birds from establishing nests in the potential impact area. These steps could include covering equipment and structures and use of various excluders (e.g. noise). Birds can be harassed to prevent them from nesting on the site. Once a nest is established, they cannot be harassed until all young have fledged and are capable of leaving the nest site.

- If construction is scheduled to start during the period when migratory birds are present, a site-specific survey for nesting migratory birds should be performed starting at least 2 weeks prior to site clearing.

- If nesting birds are found during the survey, buffer areas should be established around nests. Construction should be deferred in buffer areas until birds have left the nest. A qualified biologist should confirm that all young have fledged.

No significant adverse effects on wildlife are expected as a result of the Preferred Alternative.

4.7.2.3 Threatened, Endangered, and Sensitive Species

There are no federal or state listed threatened or endangered species documented at Schriever AFB. The plains ragweed (a globally rare species) does not occur within or in proximity to the areas proposed for development under the Preferred Alternative. Therefore, there are no potential adverse effects to threatened, endangered, and sensitive species from implementation of the Preferred Alternative.

In summary, no significant direct or indirect impacts on biological resources would be expected from construction of the proposed projects under the Preferred Alternative (Alternative 1). Prior to construction, surveys would be conducted for migratory birds, burrowing owls, small mammals (including black-tailed prairie dogs), and sensitive or protected species. If any of these species are encountered during the survey, the USFWS or the CDOW would be notified, as appropriate, for instruction on appropriate procedures to follow to ensure that the species are not adversely impacted.

4.7.3 Potential Impacts of Alternative 2 – Accelerated Construction

Under Alternative 2, Base development both inside and outside of the RA would occur on approximately 123 acres within 5 years in addition to the approximately 26 acres under the Preferred Alternative, thus increasing the acreage on which native vegetation would be replaced with development in the near term (5 years), but with the same long-term effect.

The proposed location of the antenna farm (number 23 on **Figure 4**) is located adjacent to the identified suitable habitat for the plains ragweed. Prior to refinement of the design for the farm, the northeast portion of that habitat would be reevaluated to ensure that the development would not encroach on the habitat.

The nature of potential effects to other biological resources would be essentially the same as those of the Preferred Alternative, and these would not be expected to be significant.

4.7.4 Potential Impacts of Alternative 3 – No Action Alternative

Management of Schriever AFB's natural resources by the Air Force has been conducted in accordance with policies summarized in the Base's INRMP (USAF 2008). Under the No Action Alternative, management of these resources would continue as in the past, and no impacts to the effective management of biological resources would occur.

4.8 Utilities and Infrastructure

No significant impacts on utilities and infrastructure would be expected from construction and operation of projects identified for either the Preferred Alternative (Alternative 1) or the Accelerated Construction Alternative (Alternative 2). There would be no change to utilities and infrastructure, outside of routine maintenance activities, under the No Action Alternative (Alternative 3).

4.8.1 Analysis Methods

Effects on infrastructure are evaluated for their potential to disrupt or improve existing levels of service and create additional needs for energy (electric, natural gas, and liquid fuels), central heating and cooling, potable water, sanitary sewer, stormwater systems, communications, and solid waste management. Impacts might arise from energy needs created by either direct or indirect workforce and population changes related to installation activities. An impact would be significant if implementation of the Proposed Action resulted in the following effects on electrical power, natural gas, liquid fuels, central heating and cooling, potable water, sanitary sewer/wastewater, stormwater, communications, and solid waste systems:

- Exceeded capacity of a utility,
- A long-term interruption of the utility,
- A violation of a permit condition, and
- A violation of an approved plan for that utility.

4.8.2 Potential Impacts of Alternative 1 – Preferred Alternative Action

The Preferred Alternative consists of development projects proposed for the Community Center ADP and for land areas outside and inside the RA (**Figure 3**). Construction of these facilities would require the extension/improvement of existing infrastructure (i.e., roads, electricity, gas, water, and sanitary sewer lines). Utilities would be extended from nearest tie-in to the development projects.

4.8.2.1 Electrical Systems

Construction and operation of projects proposed under the Preferred Alternative would not result in a significant increase in electricity demand nor significant impacts on the electrical systems at Schriever AFB. There is currently sufficient existing electrical capacity as provided through the Western Area Power Administration and the Tri-State Generation and Transmission Association to support development projects proposed for the Preferred Alternative.

As part of this EA, an electrical substation is proposed just outside and north of the northeast portion of the RA. This substation is needed to accommodate a new line from MVEA that would allow SAFB to reduce their current electricity rates.

4.8.2.2 Natural Gas Systems

Construction and operation of projects proposed under the Preferred Alternative would not result in any interruptions of service or significant increase overall demand on the natural gas system at Schriever AFB. Construction and operation of projects proposed under the Preferred Alternative would require natural gas and thus extension of gas lines for heating and air conditioning, but otherwise would not impact the existing natural gas infrastructure. Therefore, no significant impacts on natural gas resources at Schriever AFB would be expected.

4.8.2.3 Liquid Fuel

Construction and operation of projects proposed under the Preferred Alternative would have no impact on liquid fuel use or supplies at Schriever AFB.

4.8.2.4 Central Heating and Cooling Systems

Construction and operation of projects proposed under the Preferred Alternative would not result in any interruptions of service or increase demand beyond the capacity of the central heating and cooling systems at Schriever AFB. Construction and operation would not result in any significant impacts on central heating and cooling systems.

4.8.2.5 Water Supply Systems

Construction and operation of projects proposed under the Preferred Alternative would result in an impact on water supply systems; however, that impact is not expected to be significant. Site clearing and grading activities would require water in the short term for dust suppression. Additional water may also be required for dust control on the haul roads used for delivery of materials. During construction, the use of water would be spread throughout the entire construction period. During operations, the use of water would be spread out over the lifetime of the facilities; therefore, the increase in demand would not result in a significant impact on the daily supply of water to Schriever AFB. No service interruptions from construction would be anticipated.

4.8.2.6 Sanitary Sewer and Wastewater Systems

Construction and operation of projects proposed under the Preferred Alternative would not result in any interruptions of service or increase overall demand beyond the capacity of existing sanitary sewer and wastewater systems at Schriever AFB. Construction and operation of facilities would require connection to the sanitary sewer and wastewater system, but would not result in an exceedance of existing capacity. No significant impacts on sanitary sewer and wastewater systems at Schriever AFB would be expected.

4.8.2.7 Stormwater Systems

Construction of projects proposed under the Preferred Alternative would result in ground disturbance of up to 26 acres. These activities would potentially disrupt natural stormwater drainage patterns and increase the potential for stormwater runoff to erode soil during construction activities. Soil erosion and sediment production would be minimized during construction by following the SWPPP. Following construction, the amount of impervious surface at Schriever AFB would increase. Additional stormwater controls would be required to account for this increase in impervious surfaces in previously undisturbed land. Construction and operation of projects proposed under the Preferred Alternative would result in impacts on stormwater systems; however, these effects would be expected to be less than significant.

4.8.2.8 Communications Systems

No significant impacts on communications systems would be anticipated from construction and operation of projects proposed under the Preferred Alternative. A slight increase on the demand for telephone and data services would be expected as new facilities would require the extension/improvement of existing communications systems. No communications services interruptions would be expected.

4.8.2.9 Solid Waste Management

No significant impacts on solid waste management would be anticipated from construction and operation of projects proposed under the Preferred Alternative. Construction of facilities would require the extension/improvement of existing sanitary sewer lines. Any solid waste generated from construction would be adequately handled by the existing solid waste management plan and landfill designated for disposal.

4.8.3 Potential Impacts of Alternative 2 – Accelerated Construction

Alternative 2 would include development projects proposed for the Community Center ADP, West Campus ADP, and for land areas outside and inside the RA (**Figure 3**). Construction of these facilities would require the extension/improvement of existing infrastructure (i.e., roads, electricity, gas, water, and sanitary sewer lines). Utilities would be extended from nearest tie-in to the development projects.

Impacts on utilities and infrastructure associated with Alternative 2 (Accelerated Construction) would be similar to those of the Preferred Alternative. Although construction would occur on a shorter schedule, the current capacity of utilities is sufficient to accommodate the accelerated construction schedule.

4.8.4 Potential Impacts of Alternative 3 – No Action Alternative

Under the No Action Alternative, there would be no impact to utilities and infrastructure since no construction would occur.

4.9 Transportation

No significant direct or indirect impacts on transportation would be expected from construction and operation of projects identified for either the Preferred Alternative (Alternative 1) or the Accelerated Construction Alternative (Alternative 2). Under the No Action Alternative, there would be no impact to transportation since no construction would occur.

4.9.1 Analysis Methods

Impacts on transportation of people and goods are evaluated for their potential for disruption or improvement of current transportation patterns and systems, and deterioration or improvement of existing levels of service. Impacts can arise from physical changes to transportation, construction activity, introduction of construction-related traffic on local roads, or changes in daily or peak-hour traffic volumes created by either direct or indirect workforce and population changes related to installation activities. Impacts on roadway capacities would be significant if roads with no history of exceeding their designed capacity were forced to operate at or above those capacities.

Impacts on transportation would be considered to be adverse if the proposed action would result in a substantial increase in traffic, which is defined as more than 50 trips per hour, on local roadways. Project trip generation is based on an estimate of the number of equipment and crew members that would be present during construction activities.

4.9.2 Potential Impacts of Alternative 1 – Preferred Alternative

The Preferred Alternative includes the extension and/or improvement of roads and construction of parking lots as needed to support the proposed construction projects and to improve traffic flow within the installation. The Preferred Alternative would have short-term, negligible, adverse impacts on the regional roadway system due to the increased number of trips by large vehicles delivering materials to construction sites. Large vehicles could temporarily slow traffic on US 24, SH 94, and the roads in the vicinity of Schriever AFB as they move construction materials onto the installation. Furthermore, the influx of construction workers would have short-term, minor, adverse impacts on these roadways during installation causing only a temporary increase in traffic levels. The additional heavy traffic would also cause increased wear on existing roads, but by following Colorado Department of Transportation regulations, only short-term, negligible, adverse impacts are expected.

Direct short-term, negligible to minor, adverse impacts on traffic circulation inside Schriever AFB would be expected during construction due to temporary road and lane closures.

Long-term, beneficial impacts on Schriever AFB's transportation system would be realized from the construction of new roads and parking areas, improvements to the Enoch Road/Erwin Road intersection, and other roadway upgrades. No indirect impacts to transportation would be expected.

4.9.3 Potential Impacts of Alternative 2 – Accelerated Construction

Impacts on transportation associated with Alternative 2 (Accelerated Construction) would be similar to those of the Preferred Alternative. Although construction would occur on a shorter schedule, the current capacity of the roads on and near Schriever AFB is sufficient to accommodate the accelerated construction schedule.

4.9.4 Potential Impacts of Alternative 3 – No Action Alternative

The No Action Alternative would result in continuation of the existing conditions of transportation resources, as discussed in **Section 3.2.13.2**. No additional effects on transportation resources would be expected as a result of the Preferred Alternative not being implemented.

4.10 Compatibility of the Proposed Action with Objectives of Federal, State, and Local Land Use Plans, Policies, and Controls

The Proposed Action would be compatible with the existing Federal, Colorado, and El Paso County land use plans, policies, and controls.

Impacts on the ground surface as a result of the Proposed Action would occur entirely within the boundaries of Schriever AFB. Construction activities would not result in any significant or incompatible land use changes on- or off-installation. The Proposed Action has been sited according to future land use zones. Consequently, construction activities would not be in conflict with future installation land use policies or objectives. The Proposed Action would not conflict with any applicable off-installation land use ordinances or designated clear zones.

4.11 Relationship Between Short-Term Uses of the Environment and Long-Term Productivity

The definitions of short-term and long-term are based on the scope of the Proposed Action. Short-term use of the environment, as it relates to the Proposed Action, would encompass the construction period. Long-term productivity would occur after the construction period has ended. During construction soil would be excavated and there would be associated particulate emissions. Excavation and construction would not have a significant environmental effect and impacts would be minimized through BMPs. Areas of disturbed soil would be revegetated and stormwater flow velocity, volume, duration and temperature to drainage channels would not change from preconstruction conditions (in accordance with NPDES requirements). The proposed facilities would have a long useful life and therefore, high long-term productivity.

4.12 Cumulative Impacts

CEQ defines cumulative impacts as the "impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR 1508.7). Significant cumulative impacts could result from impacts that are not significant individually, but when considered together with other impacts, are collectively significant. Cumulative impacts can result from actions by various agencies (Federal, state, and local) or individuals. Informed decision-making is served by consideration of cumulative impacts resulting from projects that are proposed, under construction, recently completed, or anticipated for the reasonably foreseeable future. Reasonably foreseeable future actions consist of activities that have been approved and can be evaluated with respect to their effects.

Cumulative impacts associated with construction and operation of the proposed facilities include the increase in air emissions from stationary and mobile sources, soil disturbance, and impacts to water resources. Emission of criteria pollutants has been increasing at Schriever AFB over the last several years as more development has occurred and additional stationary sources, such as emergency generators and boilers have been installed. However, air quality in El Paso County has been improving for several years. Pollutant levels are lower than Federal and state standards (PPACG, 2008; PPACG, 2003). The use of construction-related vehicles and their short-term impacts on air quality is unavoidable. The short-term increases in air emissions and the impacts predicted for other resource areas would not be significant

when considered cumulatively with other previous, ongoing, or reasonably foreseeable activities at Schriever AFB or El Paso County.

Under the Preferred Alternative, approximately 26 acres would be converted from grassland or semi improved areas to impermeable surface (building and pavement areas) over the next five years (the accelerated construction alternative would result in the conversion of an additional 45 acres). Only about 15 percent of Schriever AFB has been developed; approximately 3,200 acres are undeveloped. The five-year development proposed under the Base General Plan (Alternative 1) represents about 0.7 percent of undeveloped land on the Base, while the Accelerated Alternative would represent an additional 1.4 percent. Cumulative impacts from on-base land development would not be significant. The proposed development would potentially generate increased stormwater flow from impermeable surfaces. As needed, modifications to the existing drainage system would be incorporated, which would stabilize stormwater flow and reduce the potential for erosion and sedimentation. NPDES permit requirements would be implemented for these projects, and post-construction stormwater flow would not significantly impact the existing drainage system.

Any future Federal Actions that may have potentially significant cumulative impacts the environment would be assessed in separate NEPA documents.

4.13 Irreversible and Irretrievable Commitment of Resources

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the use of these resources would have on future generations. Irreversible effects primarily result from use or destruction of a specific resource that cannot be replaced within a reasonable time frame (e.g., energy and minerals).

The irreversible and irretrievable commitment of resources that would result from implementation of the Proposed Action would most likely involve the consumption of material resources used for construction, energy resources, biological resources, and human labor resources. The loss of these resources is considered to be permanent.

4.13.1.1 Material Resources

Material resources used for the Proposed Action include building materials (for construction of facilities), concrete (for foundations), and various material supplies (for infrastructure). Most of the materials that would be consumed are not in short supply, would not limit other unrelated construction activities, and would not be considered significant.

4.13.1.2 Energy Resources

Energy resources utilized for the Proposed Action would be irretrievably lost. These include petroleum-based products (e.g., gasoline and diesel) and electricity. During construction, gasoline and diesel would be used for the operation of construction vehicles. The operation of the solar array and wind turbine would result in the generation of new electricity. Consumption of energy resources would not place a significant demand on their availability in the region. Therefore, no significant impacts would be expected.

4.13.1.3 Biological Resources

The Proposed Action would result in a permanent loss of vegetation and wildlife habitat at Schriever AFB. This loss would not be significant, however, because the communities affected are abundant in the area.

The irretrievable resources to be committed are typical for the scale of the proposed projects. Implementation of best construction management practices, standard equipment maintenance schedules, and use of energy conservation and recycling measures during the facilities construction would minimize the use of irretrievable resources. None of these materials are considered rare and the long-term commitment of these resources would not have a substantial effect on their future availability.

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B.S. Geography, GIS, University of North Carolina at Charlotte, 2004

6. LIST OF PERSONS AND AGENCIES CONSULTED

The 50 SW solicited comments on the Draft EA by distributing letters (example follows) and copies of the Draft EA to potentially interested Federal, state, and local agencies; Native American tribes; and other stakeholder groups or individuals. Responses received follow the example letter in this appendix. The following is a list of potentially interested parties that were consulted:

- U.S. Fish and Wildlife Service
- U.S. Army Corps of Engineers
- U.S. Environmental Protection Agency, Region 8
- Colorado Department of Public Health and Environment
- Colorado Division of Wildlife
- Colorado Historical Society
- Colorado Natural Heritage Program
- Colorado Public Utilities Commission
- Pikes Peak Area Council of Governments
- Northern Arapaho (Arapaho Tribe of the Wind River Reservation)
- Apache Tribe of Oklahoma
- Cheyenne and Arapaho Tribes of Oklahoma
- Northern Cheyenne
- Comanche Tribe
- Kiowa Tribe of Oklahoma
- Jicarilla Apache Nation
- Southern Ute
- Ute Mountain Ute
- Northern Ute Indian Tribe of the Uintah & Ouray Ute Reservation

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Appendix A

Agency Correspondence

Appendix B

Air Emissions Estimates for Alternatives 1 and 2

DEPARTMENT OF THE AIR FORCE
50TH SPACE WING (AFSPC)

14 July 2011

Mr. Andrew Jensen
50 CES/CEAN
500 O'Malley Ave
Schriever AFB, CO 80912-5098

Northern Ute Indian Tribe
Attn to: Historic Preservation Office
910 South 7500 East
Fort Duchesne, UT 84026

Subject: Programmatic Environmental Assessment for Proposed Base General Plan Development, Schriever AFB, Colorado

In accordance with the National Environmental Policy Act (NEPA), the 50th Space Wing (50 SW) of the U.S. Air Force has prepared a Programmatic Environmental Assessment (EA) addressing the Base General Plan Development at Schriever Air Force Base, Colorado. As described in Enclosure 1, the EA evaluates the potential environmental, cultural, and socioeconomic impacts associated with construction of facilities and other amenities at Schriever AFB.

The purpose of this correspondence is to solicit your comments regarding any environmental aspects of the proposed project that might be of concern to you. To assist us in complying with NEPA and Executive Order 12372, Intergovernmental Review of Federal Programs, and in identifying environmental issues that might affect the design or implementation of the project, we request that you provide appropriate comments within your area of expertise within 30 days of your receipt of this letter to the return address at the head of this letter.

Your input and comments are greatly appreciated. If you have any questions, please call me at (719) 567-3360 or email me at andrew.jensen-02@schriever.af.mil. Thank you for your interest.

Sincerely,

ANDREW JENSEN
EIAP Program Manager
Schriever Air Force Base

ENCLOSURE: Draft Environmental Assessment

STATE OF COLORADO

John W. Hickenlooper, Governor
Christopher E. Urbina, MD, MPH
Executive Director and Chief Medical Officer

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.
Denver, Colorado 80246-1530
Phone (303) 692-2000
Located in Glendale, Colorado

http://www.cdphe.state.co.us

Laboratory Services Division
8100 Lowry Blvd.
Denver, Colorado 80230-6928
(303) 692-3090

Colorado Department
of Public Health
and Environment

July 26, 2011

Andrew Jensen
EIAP Program Manager
50 CES/CEAN
500 O' Malley Ave.
Schriever AFB, CO 80912-5098

RE: Schriever AFB, Programmatic EA

Dear Mr. Jensen:

On July 14, 2011, the Colorado Air Pollution Control Division received a request for an air quality determination concerning Schriever AFB, Progammatic EA. Thank you for taking the time to inquire about air quality requirements in this area. The following information pertains to air quality issues only.

All sources of air emissions in Colorado are required to obtain a construction permit unless they are specifically exempted by the provision of **Regulation No. 3.** The link to Regulation No. 3 is: http://www.cdphe.co.us/regulations/airreg. Choose Air Quality Control Commission Regulations, then choose Regulation No. 3.

The first phase of air permitting involves submission of an Application for Construction Permit for each facility and one **Air Pollution Emission Notices (APEN)** for each emission source. For purposes of Air Pollution Emission Notice reporting, a source can be an individual emission point or group of similar emission points (Ref: Regulation No. 3, Part A) Both APEN reporting and permit requirements are triggered by uncontrolled actual emission rates. Uncontrolled actual emissions are calculated based on the requested production/operating rate assuming no control equipment is used. In general, an APEN is required for an emission point with uncontrolled actual emissions of any criteria pollutant equal to or greater than the quantity listed in the table below:

AREA	UNCONTROLLED ACTUAL EMISSIONS
Attainment Areas	2 Tons Per Year
Non-attainment Areas	1 Ton Per Year
All Areas	Lead Emissions: 100 pounds per year

Please consult http://www.cdphe.state.co.us/ap/attainmaintain.html to determine if your project will be located within an **attainment or non-attainment area**. Other exemptions may be found in Regulation No. 3, Part A, Section II.D.1 However, a source may not be exempted if the source would otherwise be subject to any specific federally applicable requirement.

Sources of **non-criteria reportable pollutants** have different reporting levels depending on the pollutant, release point height, and distance to property line. Please see **Appendix A and Appendix C of Regulation No. 3** for determining the appropriate reporting level for each pollutant and for the list of non-criteria reportable air pollutants. The following chart will assist you in determining your reportable non-criteria pollutant levels from your project.

However, none of the exemptions from Air Pollution Emission Notice filing requirements described above shall apply if a source would otherwise be subject to any specific federal or state applicable requirement. Information concerning submittal of revised Air Pollution Emission Notices is also given in Regulation No. 3, Part A. An Air Pollutant Emission Notice is valid for a period of five years. The five-year period recommences when a revised APEN is received by the Division.

If you have any questions regarding your reporting and permitting obligations please call the Small Business Assistance Program at 303-692-3148 or 303-692-3175.

Land development (earth moving) activities that are greater than 25 acres or more than 6 months in duration will most likely be required to submit an APEN to the Division and may be required to obtain an air permit. In addition a startup notice must be submitted 30 days prior to commencement of the land development project.

Please refer to the following link for additional information:
http://www.cdphe.state.co.us/ap/downloadforms.html, **Permit Application and APEN Forms**, then scroll to: Land Development – Specialty APEN for the form and guidance.

If you have any questions or feel as though you need more information on possible air pollution permits or notice requirements, please contact me directly at 303-692-3127 or the Colorado Air Pollution Control Division's Stationary Source Program at 303-692-3150. I can also be reached via email at jim.dileo@state.co.us.

Again, thank you for taking the time to contact the Division about this project.

Sincerely,

James A DiLeo
NEPA Coordinator
Colorado Air Pollution Control Division

DEPARTMENT OF THE AIR FORCE
50TH SPACE WING (AFSPC)

14 July 2011

Mr. Andrew Jensen
50 CES/CEAN
500 O'Malley Ave
Schriever AFB, CO 80912-5098

2011TA0611
U.S. FISH AND WILDLIFE SERVICE
☒ NO CONCERNS
JUL 26 2011
SUSAN C. LINNER DATE
COLORADO FIELD SUPERVISOR

Ms. Susan Linner
U.S. Fish and Wildlife Service
PO Box 25486
Denver, CO 80225-0486

Subject: Programmatic Environmental Assessment for Proposed Base General Plan Development, Schriever AFB, Colorado

Dear Ms. Linner,

In accordance with the National Environmental Policy Act (NEPA), the 50th Space Wing (50 SW) of the U.S. Air Force has prepared a Programmatic Environmental Assessment (EA) addressing the Base General Plan Development at Schriever Air Force Base, Colorado. As described in Enclosure 1, the EA evaluates the potential environmental, cultural, and socioeconomic impacts associated with construction of facilities and other amenities at Schriever AFB.

The purpose of this correspondence is to solicit your comments regarding any environmental aspects of the proposed project that might be of concern to you. To assist us in complying with NEPA and Executive Order 12372, Intergovernmental Review of Federal Programs, and in identifying environmental issues that might affect the design or implementation of the project, we request that you provide appropriate comments within your area of expertise within 30 days of your receipt of this letter to the return address at the head of this letter.

Your input and comments are greatly appreciated. If you have any questions, please call me at (719) 567-3360 or email me at andrew.jensen-02@schriever.af.mil. Thank you for your interest.

Sincerely,

ANDREW JENSEN
EIAP Program Manager
Schriever Air Force Base

ENCLOSURE: Draft Environmental Assessment

AFFIDAVIT OF PUBLICATION

STATE OF COLORADO
COUNTY OF EL PASO

NOTICE OF AVAILABILITY
DRAFT PROGRAMMATIC ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT FOR BASE GENERAL PLAN DEVELOPMENT AT SCHRIEVER AIR FORCE BASE, COLORADO

Interested parties are hereby notified that the United States Air Force, Schriever Air Force Base, Colorado has completed a Draft Programmatic Environmental Assessment (EA) that resulted in a Finding of No Significant Impact (FONSI) for General Plan Development. The EA documents the proposed action components for the project — constructing facilities and other amenities to support existing and future missions, provide Base support, and improve the quality of life at Schriever Air Force Base.

The Draft EA and FONSI, dated June 2011, are available for review at the following locations:

East Library 550 North Union Blvd. Colorado Springs, Colorado 80918	Penrose Library 20 North Cascade Ave. Colorado Springs, Colorado 80903

The Draft EA and FONSI can also be accessed via the following web site: **http://www.schriever.af.mil/units/publicaffairs/index.asp**

The public review and comment period for this EA is 30 days from the publication date of this Notice of Availability. Written comments and inquiries on the EA should be directed to the 50th Space Wing Public Affairs Office, 210 Falcon Parkway, Suite 2102, Schriever Air Force Base, CO 80912-2102. Fax: 719-567-5306. Email: 50SWPA@afspc.af.mil.

Published in The Gazette July 17, 2011.

Appendix B

Air Emissions Estimates for Alternatives 1 and 2

ACTIVITIES INCLUDED IN ALTERNATIVE 1
PREFERRED ALTERNATIVE
(Activity ID Numbers 1 - 14)

Table 1
Faciltiy Emissions Summary
(Construction Phase & Operational Phase)

Construction Phase Emissions

Emission Category	Basis for Emissions	Total Emissions [(A)] (tons)							
		CO	NOx	PM10	PM2.5	SO2	VOCs	Total HAPs	CO2
On-Road Vehicles	U.S. EPA MOBILE6.2 model	31.01	1.85	0.07	0.04	0.02	1.61	0.16	1,332
Off-Road Power Equipment	U.S. EPA NONROAD model	3.73	6.93	0.71	0.69	0.24	0.64	0.09	1,190
Fugitive Dust	Various Emission Factors	---	---	5.69	0.76	---	---	---	---
Hot-Mix Asphalt Plant and Pavement Curing	U.S. EPA AP-42 Emission Factors	3.95	0.25	0.27	0.23	0.05	0.48	0.07	365
Surface Coating	Mass Balance	---	---	---	---	---	6.97	---	---
TOTALS		**38.69**	**9.03**	**6.75**	**1.71**	**0.30**	**9.69**	**0.32**	**2,886**

(A) Emission calculations for the various emission categories are presented in the following tables.

Operational Phase Emissions

Emission Category	Basis for Emissions	Annual Emissions [(B)] (ton/yr)							
		CO	NOx	PM10	PM2.5	SO2	VOCs	Total HAPs	CO2
Increased Traffic	U.S. EPA MOBILE6.2 model	(increase in on-site staffing is not anticipated with the proposed expansion)							
Space Heating	U.S. EPA AP-42 Emission Factors	0.70	0.83	0.06	0.06	0.005	0.05	0.02	997
Emergency Generators	U.S. EPA AP-42 Emission Factors	0.60	2.60	0.06	0.05	0.001	0.07	0.001	126
TOTALS		**1.29**	**3.44**	**0.13**	**0.12**	**0.006**	**0.12**	**0.02**	**1123**

(B) Emission calculations for the various emission categories are presented in the following tables.

ACTIVITIES INCLUDED IN ALTERNATIVE 1
PREFERRED ALTERNATIVE
(Activity ID Numbers 1 - 14)

Table 2
Construction Phase - On-Road Vehicles
Emissions based on MOBILE 6.2 Emission Factors

MOBILE6.2 Model Emission Factors

Evaluation [A] Year	Evaluation [A] Month	Vehicle [B] Type	Vehicle Emission Factors [C, D] (gram/mile)							
			CO	NOx	PM10	PM2.5	SO2	VOCs	HAPs	CO2
2014	January	LDGV	14.810	0.454	0.0248	0.0113	0.0068	0.449	0.038	368.100
		LDGT	16.590	0.729	0.0249	0.0113	0.0095	0.688	0.060	515.400
		HDDV	1.564	3.615	0.1303	0.0965	0.0132	0.459	0.061	1413.300
2014	July	LDGV	6.890	0.441	0.0248	0.0113	0.0068	0.451	0.038	368.100
		LDGT	8.410	0.682	0.0249	0.0113	0.0095	0.659	0.081	515.700
		HDDV	1.475	3.374	0.1251	0.0917	0.0132	0.452	0.060	1413.000
2015	January	LDGV	14.510	0.417	0.0248	0.0112	0.0068	0.419	0.035	368.000
		LDGT	16.060	0.679	0.0248	0.0113	0.0095	0.652	0.057	515.400
		HDDV	1.367	3.141	0.1147	0.0820	0.0132	0.437	0.058	1412.500

(A) U.S. EPA 's MOBILE6.2 guidance: Estimation of Annual Average Emission Factor requires 3 separate runs: January of the Evaluation Year, July of the Evaluation Year, and January of the following year. The Annual Average Emission Factor is then calculated as ((3 x Jan of Evaluation Year) + (6 x Jul of Evaluation Year) + (3 x Jan of Following Year)) / 12. For the Preferred Action, an Evaluation Year of 2014 was selected to represent the midpoint of the construction projects.

(B) Vehicle Types: LDGV = light duty gasoline vehicle, LDGT = light duty gasoline truck, HDDV = heavy duty diesel vehicle.

(C) Emission factors for vehicles during Construction Phase are from U.S. EPA's MOBILE6.2 emission model based on Colorado Springs climate data, various evaluation years and months, average vehicle speed of 45 mph, gasoline RVP = 9.0 for July and 16.0 for January, gasoline sulfur = 30 ppm, and diesel sulfur = 15 ppm (ultra-low diesel sulfur mandated for on-road vehicles starting 2007).

(D) MOBILE6.2 emission factors for PM2.5 and PM10 are "Total PM" which includes exhaust/tire/brake PM.

MOBILE6.2 Average Emission Factors

Evaluation Year		Vehicle Type	Average Emission Factor [E] (gram/mile)							
			CO	NOx	PM10	PM2.5	SO2	VOCs	HAPs	CO2
2014		LDGV	10.775	0.438	0.0248	0.0113	0.0068	0.443	0.037	368.075
		LDGT	12.368	0.693	0.0249	0.0113	0.0095	0.665	0.070	515.550
		HDDV	1.470	3.376	0.1238	0.0905	0.0132	0.450	0.060	1412.950

(E) MOBILE6.2 guidance: Annual Average Emission Factor = ((3 x Jan of Current Year) + (6 x Jul of Current Year) + (3 x Jan of Following Year)) / 12

Emission Calculations

Vehicle Description [F]	Traffic Count (vehicles/day)	Round Trip (miles/vehicle)	Total Work Days (days)	Total Miles [G] (mile)	Vehicle Type	Total Emissions [H] (tons)							
						CO	NOx	PM10	PM2.5	SO2	VOCs	HAPs	CO2
Worker Passenger Cars	12	30	1,560	561,600	LDGV	6.670	0.271	0.015	0.007	0.004	0.274	0.023	228
Worker Light Trucks/SUVs	38	30	1,560	1,778,400	LDGT	24.244	1.359	0.049	0.022	0.019	1.303	0.137	1011
Asphalt Trucks	9	15	7	945	HDDV	0.002	0.004	0.0001	0.0001	0.00001	0.0005	0.0001	1.5
Concrete Trucks	2	15	149	4,470	HDDV	0.007	0.017	0.0006	0.0004	0.0001	0.002	0.0003	7
Delivery/Haul Trucks	24	15	130	46,800	HDDV	0.076	0.174	0.006	0.005	0.001	0.023	0.003	73
Watering Trucks	2	5	750	7,500	HDDV	0.012	0.028	0.001	0.001	0.0001	0.004	0.0005	12
TOTALS						**31.01**	**1.85**	**0.07**	**0.04**	**0.02**	**1.61**	**0.16**	**1332**

(F) Vehicle types, traffic counts, round trip distances, and work day estimates are based on scaling of similar type of project activity listed in the Environmental Assessment - Base General Plan (Schriever AFB, September 2007). For worker vehicles, it is assumed that there will be 50 workers per work day over the 6-year project period, split 25% passenger cars and 75% light trucks/SUVs, and annual work days = 260 day/yr. For watering trucks, total work days = 125 day/yr × 6 yr project period.

(G) Total Miles (mile) = Traffic Count (vehicles/day) x Round Trip Distance (mile/vehicle) x Total Work Days (day)

(H) Total Emissions (tons) = Emission Factor (gram/mile) x Total Miles (mile) x (1 lb / 453.6 g) x (1 ton / 2000 lb)

ACTIVITIES INCLUDED IN ALTERNATIVE 1
PREFERRED ALTERNATIVE
(Activity ID Numbers 1 - 14)

Table 3
Construction Phase - Off-Road Power Equipment
Emissions based on NONROAD Emission Factors

NONROAD Model Regional Emissions (for Scaling PM2.5 and VOC Emission Factors)

Evaluation Year	Region	Equipment Considered in NONROAD Modeling	Regional Emissions (tons)				Ratio [A] PM2.5/PM10	Ratio [B] VOC/THC
			PM10	PM2.5	VOC	THC		
2014	El Paso County, Colorado	Air Compressors, Backhoes/Loaders, Bulldozers, Cranes, Excavators, Generators, Graders, Pavers, Rollers, and Scrapers	67.67	65.64	68.58	65.13	0.97	1.05

(A) U.S. EPA 's NONROAD model (version 2008) provides Total (i.e., Regional) Emission reports for both PM2.5 and PM10. The ratio of these values is used to scale the PM10 emission factor to PM2.5.

(B) NONROAD provides Total Emission reports for both VOCs and THC (total hydrocarbons). The ratio of these values is used to scale the THC emission factor to VOCs.

NONROAD Model Emission Factors

Equipment Description	Fuel	SCC Code	Engine Size (hp)	Emission Factor (g/hp-hr) [C]								
				CO	NOx	PM10	PM2.5 [D]	SO2	VOCs [E]	HAPs [F]	CO2	THC
Air Compressor	Diesel	2270006015	40	1.278	4.283	0.271	0.263	0.117	0.263	0.035	589.58	0.250
Backhoe/Loader	Diesel	2270002066	75	5.439	5.215	0.835	0.810	0.144	1.037	0.138	692.92	0.985
Bulldozer	Diesel	2270002069	150	1.000	2.408	0.288	0.279	0.104	0.217	0.029	536.18	0.206
Crane	Diesel	2270002045	100	1.933	3.374	0.341	0.331	0.117	0.303	0.040	589.47	0.288
Excavator	Diesel	2270002036	100	2.570	2.680	0.403	0.391	0.114	0.232	0.031	595.46	0.220
Generator	Diesel	2277006005	40	2.154	4.920	0.432	0.419	0.122	0.577	0.077	588.65	0.548
Grader	Diesel	2270002048	100	2.690	2.874	0.410	0.398	0.115	0.255	0.034	595.40	0.242
Paver	Diesel	2277002003	150	1.045	2.604	0.290	0.281	0.105	0.234	0.031	536.14	0.222
Roller	Diesel	2277002015	75	2.667	3.726	0.346	0.336	0.121	0.302	0.040	595.26	0.287
Scraper	Diesel	2277002018	150	1.005	2.437	0.288	0.279	0.104	0.219	0.029	536.18	0.208

(C) Regional Emissions and Emission Factors for off-highway vehicles from U.S. EPA's NONROAD model for El Paso County, Colorado and evaluation year 2014. NONROAD provides Regional Emissions for PM2.5, PM10, total hydrocarbons (THC), and VOCs, but provides Emission Factors only for CO, NOx, PM10, SO2, CO2, and THC.

(D) Emission factor for PM2.5 = (Emission Factor for PM10) × (PM2.5-to-PM10 Regional Emissions Ratio).

(E) Emission Factor for VOCs = (Emission Factor for THC) × (VOC-to-THC Regional Emissions Ratio).

(F) Emission Factor for HAPs = (VOC Emission Factor) × (Ratio of HAP-to-VOC Emission Factors from the EPA's MOBILE6.2 model output for HDDV on-road contruction vehicles in Table 2).

Emission Calculations

Equipment [G] Description	Total Operating Hours by Construciton Activity				Total Hours	Engine Size (hp)	NonRoad [H] Load Factor	Total Emissions [I] (tons)							
	Grading	Building	Paving	Utilities				CO	NOx	PM10	PM2.5	SO2	VOCs	HAPs	CO2
Air Compressor	---	15,344	---	---	15,344	40	43%	0.372	1.246	0.079	0.076	0.034	0.077	0.010	172
Backhoe/Loader	216	---	---	2,720	2,936	75	21%	0.277	0.266	0.043	0.041	0.007	0.053	0.007	35
Bulldozer	1,648	---	---	2,720	4,368	150	59%	0.426	1.026	0.123	0.119	0.044	0.092	0.012	228
Crane	---	15,344	---	344	15,688	100	43%	1.437	2.509	0.254	0.246	0.087	0.225	0.030	438
Excavator	---	---	---	3,408	3,408	100	59%	0.570	0.594	0.089	0.087	0.025	0.051	0.007	132
Generator	---	10,224	---	---	10,224	40	43%	0.418	0.954	0.084	0.081	0.024	0.112	0.015	114
Grader	824	---	---	---	824	100	59%	0.144	0.154	0.022	0.021	0.006	0.014	0.002	32
Paver	---	---	56	---	56	150	59%	0.006	0.014	0.002	0.002	0.001	0.001	0.0002	3
Roller	168	---	56	---	224	75	59%	0.029	0.041	0.004	0.004	0.001	0.003	0.0004	7
Scraper	552	---	---	---	552	150	59%	0.054	0.131	0.016	0.015	0.006	0.012	0.002	29
TOTALS								**3.73**	**6.93**	**0.71**	**0.69**	**0.24**	**0.64**	**0.09**	**1190**

(G) Information on equipment types, fuel, engine size, and operating hours are based on scaling current proposed project to similar type of project activity as listed in the Environmental Assessment - Base General Plan (Schriever AFB, September 2007).

(H) Load Factors based on statistical values listed in the NONROAD model ACTIVITY.DAT database file.

(I) Total Emissions (tons) = Emission Factor (g/hp-hr) x Engine Size (hp) x Operating Hours (hr) x Load Factor (%) x (1 lb / 453.6 g) x (1 ton / 2000 lb)

ACTIVITIES INCLUDED IN ALTERNATIVE 1
PREFERRED ALTERNATIVE
(Activity ID Numbers 1 - 14)

Table 4
Construction Phase - Fugitive Dust
Emissions from Construction Activity

Emission Factors

Description	Silt Content (%)	Silt Loading (g/m^2)	Material Moisture Content (%)	Average Vehicle Weight (ton)	Emissions Factor (lb/hr)	
					PM10	PM2.5
Grading - Bulldozing [A]	6.9	-	7.9	-	0.753	0.414
Description					Emissions Factor (lb/VMT)	
					PM10	PM2.5
Trucks on Paved Roads [B]	-	0.6	-	10	0.014	0.004
Trucks on Unpaved Roads [C]	8.5	-	-	10	1.891	0.189

(A) Emission Factors determined from US EPA AP-42 Section 11.9 (Oct 1998):

- PM10 (lb/hr) = $0.75 \times (1.0 \times s^{1.5}) / M^{1.4}$ (AP-42 Table 11.9-1 Bulldozing equation for PM ≤15 µm, scaling factor for PM ≤10 µm, and footnote d)

- PM2.5 (lb/hr) = $0.105 \times (5.7 \times s^{1.2}) / M^{1.3}$ (AP-42 Table 11.9-1 Bulldozing equation for TSP ≤30 µm, scaling factor for PM ≤2.5 µm, and footnote e)

where s = silt content (%) and M = moisture content (%). The silt content and moisture content for western overburden was estimated from AP-42 Table 11.9-3 (geometric mean).

(B) Emission Factors for Paved Roads determined from US EPA AP-42 Section 13.2.1 (Jan 2011), Equation (1):

- PM10 (lb/VMT) = $0.0022 \times (sL^{0.91}) / (W^{1.02})$

- PM2.5 (lb/VMT) = $0.00054 \times (sL^{0.91}) / (W^{1.02})$

where VMT = vehicle miles traveled, sL = silt loading of the road surface (g/m^2) and W = average vehicle weight (tons). Constants for the equations were taken from Table 13.2.1-1. The silt loading was taken from AP-42 Table 13.2.1-2 as the ubiquitous baseline for low average daily traffic roads (non-winter conditions). For vehicle weight, an average of unloaded and loaded truck weight is assumed.

(C) Emission Factors for Unpaved Roads determined from US EPA AP-42 Section 13.2.2 (Nov 2006), Equation (1a):

- PM10 (lb/VMT) = $1.5 \times (s/12)^{0.9} / (W/3)^{0.45}$

- PM2.5 (lb/VMT) = $0.15 \times (s/12)^{0.9} / (W/3)^{0.45}$

where VMT = vehicle miles traveled, s = silt content of surface material (%) and W = average vehicle weight (tons). Constants for the equations were taken from Table 13.2.2-2. The silt content was taken from AP-42 Table 13.2.2-1 as the mean for construction sites. For vehicle weight, an average of unloaded and loaded truck weight is assumed.

Emission Calculations

Description	Total Hours (hr)	Total Vehicle Miles (mi)	Total Emissions (Tons)	
			PM10	PM2.5
Grading - Bulldozing [D]	844	---	0.32	0.17
Trucks on Paved Roads [E]	---	46,800	0.34	0.08
Trucks on Unpaved Roads [E]	---	5,328	5.04	0.50
TOTALS			**5.69**	**0.76**

(D) Total Emissions (tons) = Emission Factors (lb/hr) × Total Operating Hours (hr) × (1 ton / 2000 lb), where:
Total Operating Time (hr) = Disturbed Area (acres) × [Grading Time (day/acre) + Fill & Level Time (day/acre)] × Work Day (hr/day)

- *Disturbed Area: 28.5 acres*
- *Grading Time: 1.2 day/acre*
- *Fill & Leveling Time: 2.5 day/acre*
- *Work Day: 8 hr/day*

(E) Total Emissions (tons) = Emission Factors (lb/VMT) × Total Vehicle Miles (mi) × (1 ton / 2000 lb), where:
Total Vehicle Miles (mi) = Round Trip (mi/truck) × Number of Vehicles (truck/hr) × Work Day (hr/day) × Construction Time (days)

	Paved Roads	Unpaved Roads	
• Round Trip:	15	2	mile/truck
• Number of Vehicles:	3	3	truck/hr
• Work Day:	8	8	day/acre
• Construction Time:	130	111	hr/day

Table 5
Construction - Hot-Mix Asphalt Plant and Pavement Curing

Emission Factors

Activity	Emission Factors (lb/ton of asphalt)							
	CO	NOx	PM10	PM2.5	SO2	VOCs	HAPs	CO2
Hot-Mix Asphalt [A]	0.40	0.025	0.027	0.023	0.0046	0.0082	0.0076	37
Hot-Mix Asphalt Pavement Curing [B]	---	---	---	---	---	0.04	---	---

(A) Emission factors for hot-mix asphalt plants from U.S. EPA AP-42 Section 11.1 (Tables 11.1-1, 11-1-2, 11.1-5, 11.1-6, 11.1-9), assuming batch mixing, natural gas firing, fabric filter control of particulates, and ratio of PM2.5 to PM10 based on particle size cumulative mass distribution % of each for fabric filter. PM2.5 emission factor = (PM10 emission factor from Table 11.1-1) × (33% PM2.5 / 39% PM10 from Table 11.1-2).

(B) EPA AP-42 Section 4.5 for asphalt paving states that VOC emissions from hot-mix and emulsified asphalt are minor, and provides emission factors for cutback asphalt only. Since, cutback asphalt will not be used, the following literature was used to obtain emission factors for hot-mix asphalt curing:

- *VOC emission factor for hot-mix asphalt from California Air Resource Board, Comparison of Asphalt Paving Emission Factors, 5/11/2005.*
- *There are no NOx, PM2.5, or SO2 emissions associated with curing of asphalt pavement.*

Emission Calculations

Activity	Hot-Mix Asphalt [C] (tons)	Emissions [D] (tons)							
		CO	NOx	PM10	PM2.5	SO2	VOCs	HAPs	CO2
Hot-Mix Asphalt [C]	19,729	3.95	0.25	0.27	0.23	0.05	0.08	0.07	365
Hot-Mix Asphalt Pavement Curing [D]		---	---	---	---	---	0.39	---	---
TOTAL		**3.95**	**0.25**	**0.27**	**0.23**	**0.05**	**0.48**	**0.07**	**365**

(C) Asphalt quantity is estimated based on scaling of similar type of project activity listed in the Environmental Assessment - Base General Plan (Schriever AFB, September 2007). Asphalt type is assumed to be hot-mix asphalt.

(D) Emissions (tons) = Quantity of Hot-Mix Asphalt (tons) × Emission Factor (lb/ton of asphalt) × (1 ton / 2000 lb).

Table 6
Construction Phase - Surface Coating

Emission Factors

Activity	Emission Factor [A, B, C, D] (tons)							
	CO	NOx	PM10	PM2.5	SO2	VOCs	HAPs	CO2
Surface Coating - Interior	---	---	---	---	---	3.175	---	---

(A) There are no CO, NOx, or SO2 emissions associated with surface coating.

(B) Since painting is performed indoors, particulate matter emissions escaping to the outside atmosphere are considered to be negligible.

(C) VOC content assumed to be the higher of the federal VOC limit of 250 g/l (2.09 lb/gal) for interior flat paints and 380 g/l (3.175 lb/gal) for interior non-flat paints. These federal limits are defined in 40 CFR 59 Subpart D "National Volatile Organic Compound Emission Standards for Architectural Coatings". This regulation is referred to as the AIM (Architectural and Industrial Maintenance) Rule.

(D) 100% of volatile component is assumed to be emitted indoors and then escape to the atmosphere through building ventilation.

Emission Calculations

Activity	Paint Usage [E] (gallons)	Emissions [F] (tons)							
		CO	NOx	PM10	PM2.5	SO2	VOCs	HAPs	CO2
Surface Coating - Interior	4,390	---	---	---	---	---	**6.97**	---	---

(E) Paint usage estimated as follows:

Total Building Floor Coverage =	*439,000*	*sq ft (total for all planned projects)*
Scaling Factor for Painted Surface =	*4.00*	*to account for floor, wall, and ceiling surfaces*
Surface Area to be Painted =	*1,756,000*	*sq ft (Surface Area = Building Area x Scaling Factor)*
Paint Coverage =	*400*	*sq ft/gallon*
Paint Quantity =	*4,390*	*gallons (Quantity = Surface Area / Paint Coverage)*

(F) Emissions (tons) = Paint Usage (gal) × Emission Factor (lb/gal) × (1 ton / 2000 lb).

ACTIVITIES INCLUDED IN ALTERNATIVE 1
PREFERRED ALTERNATIVE
(Activity ID Numbers 1 - 14)

Table 7
Operational Phase - Space Heating
Annual Emissions from Natural Gas Combustion

Emission Factors

Activity	Emission Factor [A] ($lb/10^6$ cu ft natural gas/yr)							
	CO	NOx	PM10	PM2.5	SO2	VOCs	HAPs [B]	CO2
Additional Space Heating	84.0	100.0	7.6	7.6	0.6	5.5	1.89	120,000

(A) Emission factors from EPA AP-42 Section 1, External Combustion (July 1998) for natural gas combustion units < 100 million Btu/hr.

(B) HAP emission factor is the sum of all individual HAP emission factors.

Emission Calculations

Activity	Increased Fuel Use [C] (10^6 cu ft/year)	Emissions [E] (ton/yr)							
		CO	NOx	PM10	PM2.5	SO2	VOCs	HAPs	CO2
Additional Space Heating	16.616	**0.70**	**0.83**	**0.06**	**0.06**	**0.005**	**0.05**	**0.02**	**997**

(C) The proposed projects will result in an increase in the facility's fuel usage for comfort heating based on the following information:

Fuel Type =	*Natural Gas*	
Additional Area =	*439,000*	*sq ft*
Fuel Rate =	*7.57*	*cu ft/sq ft/month (approximated from basewide annual fuel consumption, total heated area, and 6 month heating period).*
Heating Period =	*5*	*month/year*
Increased Fuel Use =	*16,616,150*	*cu ft/yr = Additional Area (sq ft) × Fuel Rate (cu ft/sq ft/month) × Heating Period (month/yr)*

(D) Annual emissions (ton/yr) = Annual Fuel Usage (10^6 cu ft/yr) x Emission Factor ($lb/10^6$ cu ft) × (1 ton / 2000 lb).

Table 8
Operational Phase - Emergency Generators
Annual Emissions from Diesel Fuel Combustion

Emission Factors

Activity	Emission Factor [A] (lb/hp-hr)							
	CO	NOx	PM10 [B]	PM2.5 [B]	SO2 [C]	VOCs [D]	HAPs [E]	CO2
Emergency Generator (>600 hp)	0.0055	0.024	0.0006	0.0005	0.000012	0.00064	0.000011	1.16

(A) Emission Factors from AP-42 Section 3.4, Large Stationary Diesel Engines (October 1996), for uncontrolled diesel engines.

(B) PM10 emission factor = (PM emission factor of 0.0007 lb/hp-hr) × (0.0573/0.0697 PM10-to-PM scaling from AP-42 Table 3.4-2)
PM2.5 emission factor = (PM emission factor of 0.0007 lb/hp-hr) × (0.0479/0.0697 PM2.5-to-PM scaling from AP-42 Table 3.4-2)

(C) SO2 emission factor = 0.00809 × Sulfur Content (%) (AP-42 Table 3.4-1). Starting October 2010, ultra-low sulfur content (i.e., 15 ppm = 0.0015%) diesel fuel shall be used (Permit 95EP772 Mod 6).

(D) VOC emission factor = (TOC emission factor from AP-42 Table 3.4-1 of 0.000705 lb/hp-hr) × (91% of TOC as non-methane from AP-42 Table 3.4-1 footnote f).

(E) HAP emission factor is the sum of all individual HAP emission factors.

Emission Calculations

Activity	Output Rating	Operating Hours [F]	Emissions [G] (ton/yr)							
	(hp)	(hr/yr)	CO	NOx	PM10	PM2.5	SO2	VOCs	HAPs	CO2
Emergency Generator (>600 hp)	1,206	180	**0.60**	**2.60**	**0.06**	**0.05**	**0.001**	**0.07**	**0.001**	**126**

(F) The proposed projects will result in an increase in the facility's fuel usage for emergency generators based on the following information:

Fuel Type =	*Diesel*	
Generator Power Output Rating =	*900*	*kW/building*
Power Output of Diesel-Fired Engine =	*1206*	*hp (based on conversion factor of 1 kW = 1.34 hp)*
Number of Buildings =	*3*	*buildings (assumes that emergency generators will only be installed at new mission-critical and security buildings)*
Annual Operating Hours =	*60*	*hr/yr per building (Assumes 5 hours of operation per month for exercise and emergency power generation).*
Total Operating Hours =	*180*	*hr/yr = Annual Operating Hours (hr/yr/building) × Number of Buildings*

(G) Annual emissions (ton/yr) = Power Output Rating (hp) x Total Operating Hours (hr/yr) x Emission Factor (lb/hp-hr) × (1 ton/2000 lb).

ADDITIONAL ACTIVITIES INCLUDED IN ALTERNATIVE 2
ACCELERATED CONSTRUCTION ALTERNATIVE
(Activity ID Numbers 15 - 24)

Table 1
Faciltiy Emissions Summary
(Construction Phase & Operational Phase)

Construction Phase Emissions

Emission Category	Basis for Emissions	Total Emissions [(A)] (tons)							
		CO	NOx	PM10	PM2.5	SO2	VOCs	Total HAPs	CO2
On-Road Vehicles	U.S. EPA MOBILE6.2 model	28.98	1.75	0.08	0.04	0.02	1.34	0.12	1,233
Off-Road Power Equipment	U.S. EPA NONROAD model	8.56	15.85	1.67	1.62	0.55	1.46	0.19	2,790
Fugitive Dust	Various Emission Factors	---	---	12.32	1.95	---	---	---	---
Hot-Mix Asphalt Plant and Pavement Curing	U.S. EPA AP-42 Emission Factors	2.72	0.17	0.18	0.16	0.03	0.33	0.05	252
Surface Coating	Mass Balance	---	---	---	---	---	14.20	---	---
TOTALS		**40.26**	**17.77**	**14.25**	**3.76**	**0.60**	**17.34**	**0.37**	**4,275**

(A) Emission calculations for the various emission categories are presented in the following tables.

Operational Phase Emissions

Emission Category	Basis for Emissions	Annual Emissions [(B)] (ton/yr)							
		CO	NOx	PM10	PM2.5	SO2	VOCs	Total HAPs	CO2
Increased Traffic	U.S. EPA MOBILE6.2 model	(increase in on-site staffing is not anticipated with the proposed expansion)							
Space Heating	U.S. EPA AP-42 Emission Factors	1.42	1.69	0.13	0.13	0.010	0.09	0.032	2,032
Emergency Generators	U.S. EPA AP-42 Emission Factors	0.80	3.47	0.08	0.07	0.002	0.09	0.002	168
TOTALS		**2.22**	**5.17**	**0.21**	**0.20**	**0.012**	**0.19**	**0.03**	**2,200**

(B) Emission calculations for the various emission categories are presented in the following tables.

ADDITIONAL ACTIVITIES INCLUDED IN ALTERNATIVE 2
ACCELERATED CONSTRUCTION ALTERNATIVE
(Activity ID Numbers 15 - 24)

Table 2
Construction Phase - On-Road Vehicles
Emissions based on MOBILE 6.2 Emission Factors

MOBILE6.2 Model Emission Factors

Evaluation [A] Year	Evaluation [A] Month	Vehicle [B] Type	Vehicle Emission Factors [C, D] (gram/mile)							
			CO	NOx	PM10	PM2.5	SO2	VOCs	HAPs	CO2
2014	January	LDGV	14.810	0.454	0.0248	0.0113	0.0068	0.449	0.038	368.100
		LDGT	16.590	0.729	0.0249	0.0113	0.0095	0.688	0.060	515.400
		HDDV	1.564	3.615	0.1303	0.0965	0.0132	0.459	0.061	1413.300
2014	July	LDGV	6.890	0.441	0.0248	0.0113	0.0068	0.451	0.038	368.100
		LDGT	8.410	0.682	0.0249	0.0113	0.0095	0.659	0.081	515.700
		HDDV	1.475	3.374	0.1251	0.0917	0.0132	0.452	0.060	1413.000
2015	January	LDGV	14.510	0.417	0.0248	0.0112	0.0068	0.419	0.035	368.000
		LDGT	16.060	0.679	0.0248	0.0113	0.0095	0.652	0.057	515.400
		HDDV	1.367	3.141	0.1147	0.0820	0.0132	0.437	0.058	1412.500

(A) U.S. EPA 's MOBILE6.2 guidance: Estimation of Annual Average Emission Factor requires 3 separate runs: January of the Evaluation Year, July of the Evaluation Year, and January of the following year. The Annual Average Emission Factor is then calculated as ((3 x Jan of Evaluation Year) + (6 x Jul of Evaluation Year) + (3 x Jan of Following Year)) / 12. For the Preferred Action, an Evaluation Year of 2014 was selected to represent the midpoint of the construction projects.

(B) Vehicle Types: LDGV = light duty gasoline vehicle, LDGT = light duty gasoline truck, HDDV = heavy duty diesel vehicle.

(C) Emission factors for vehicles during Construction Phase are from U.S. EPA's MOBILE6.2 emission model based on Colorado Springs climate data, various evaluation years and months, average vehicle speed of 45 mph, gasoline RVP = 9.0 for July and 16.0 for January, gasoline sulfur = 30 ppm, and diesel sulfur = 15 ppm (ultra-low diesel sulfur mandated for on-road vehicles starting 2007).

(D) MOBILE6.2 emission factors for PM2.5 and PM10 are "Total PM" which includes exhaust/tire/brake PM.

MOBILE6.2 Average Emission Factors

Evaluation Year	Vehicle Type	Average Emission Factor [E] (gram/mile)							
		CO	NOx	PM10	PM2.5	SO2	VOCs	HAPs	CO2
2014	LDGV	10.775	0.438	0.0248	0.0113	0.0068	0.443	0.037	368.075
	LDGT	12.368	0.693	0.0249	0.0113	0.0095	0.665	0.070	515.550
	HDDV	1.470	3.376	0.1238	0.0905	0.0132	0.450	0.060	1412.950

(E) MOBILE6.2 guidance: Annual Average Emission Factor = ((3 x Jan of Current Year) + (6 x Jul of Current Year) + (3 x Jan of Following Year)) / 12

Emission Calculations

Vehicle Description [F]	Traffic Count (vehicles/day)	Round Trip (miles/vehicle)	Total Work Days (days)	Total Miles [G] (mile)	Vehicle Type	Total Emissions [H] (tons)							
						CO	NOx	PM10	PM2.5	SO2	VOCs	HAPs	CO2
Worker Passenger Cars	38	30	1,560	1,778,400	LDGV	21.122	0.859	0.049	0.022	0.013	0.867	0.073	722
Worker Light Trucks/SUVs	12	30	1,560	561,600	LDGT	7.656	0.429	0.015	0.007	0.006	0.411	0.043	319
Asphalt Trucks	9	15	30	4,050	HDDV	0.007	0.015	0.001	0.0004	0.0001	0.002	0.0003	6
Concrete Trucks	2	15	304	9,120	HDDV	0.015	0.034	0.001	0.001	0.0001	0.005	0.001	14
Delivery/Haul Trucks	24	15	265	95,400	HDDV	0.155	0.355	0.013	0.010	0.001	0.047	0.006	149
Watering Trucks	4	5	750	15,000	HDDV	0.024	0.056	0.002	0.001	0.0002	0.007	0.001	23
TOTALS						**28.98**	**1.75**	**0.08**	**0.04**	**0.02**	**1.34**	**0.12**	**1233**

(F) Vehicle types, traffic counts, round trip distances, and work day estimates are based on scaling of similar type of project activity listed in the Environmental Assessment - Base General Plan (Schriever AFB, September 2007). For worker vehicles, it is assumed that there will be 50 workers per work day over the 6-year project period, split 25% passenger cars and 75% light trucks/SUVs, and annual work days = 260 day/yr. For watering trucks, total work days = 125 day/yr × 6 yr project period.

(G) Total Miles (mile) = Traffic Count (vehicles/day) x Round Trip Distance (mile/vehicle) x Total Work Days (day)

(H) Total Emissions (tons) = Emission Factor (gram/mile) x Total Miles (mile) x (1 lb / 453.6 g) x (1 ton / 2000 lb)

ADDITIONAL ACTIVITIES INCLUDED IN ALTERNATIVE 2
ACCELERATED CONSTRUCTION ALTERNATIVE
(Activity ID Numbers 15 - 24)

Table 3
Construction Phase - Off-Road Power Equipment
Emissions based on NONROAD Emission Factors

NONROAD Model Regional Emissions (for Scaling PM2.5 and VOC Emission Factors)

Evaluation Year	Region	Equipment Considered in NONROAD Modeling	Regional Emissions (tons)				Ratio [A] PM2.5/PM10	Ratio [B] VOC/THC
			PM10	PM2.5	VOC	THC		
2014	El Paso County, Colorado	Air Compressors, Backhoes/Loaders, Bulldozers, Cranes, Excavators, Generators, Graders, Pavers, Rollers, and Scrapers	67.67	65.64	68.58	65.13	0.97	1.05

(A) U.S. EPA 's NONROAD model (version 2008) provides Total (i.e., Regional) Emission reports for both PM2.5 and PM10. The ratio of these values is used to scale the PM10 emission factor to PM2.5.
(B) NONROAD provides Total Emission reports for both VOCs and THC (total hydrocarbons). The ratio of these values is used to scale the THC emission factor to VOCs.

NONROAD Model Emission Factors

Equipment Description	Fuel	SCC Code	Engine Size (hp)	Emission Factor (g/hp-hr) [C]								
				CO	NOx	PM10	PM2.5 [D]	SO2	VOCs [E]	HAPs [F]	CO2	THC
Air Compressor	Diesel	2270006015	40	1.278	4.283	0.271	0.263	0.117	0.263	0.035	589.58	0.250
Backhoe/Loader	Diesel	2270002066	75	5.439	5.215	0.835	0.810	0.144	1.037	0.138	692.92	0.985
Bulldozer	Diesel	2270002069	150	1.000	2.408	0.288	0.279	0.104	0.217	0.029	536.18	0.206
Crane	Diesel	2270002045	100	1.933	3.374	0.341	0.331	0.117	0.303	0.040	589.47	0.288
Excavator	Diesel	2270002036	100	2.570	2.680	0.403	0.391	0.114	0.232	0.031	595.46	0.220
Generator	Diesel	2277006005	40	2.154	4.920	0.432	0.419	0.122	0.577	0.077	588.65	0.548
Grader	Diesel	2270002048	100	2.690	2.874	0.410	0.398	0.115	0.255	0.034	595.40	0.242
Paver	Diesel	2277002003	150	1.045	2.604	0.290	0.281	0.105	0.234	0.031	536.14	0.222
Roller	Diesel	2277002015	75	2.667	3.726	0.346	0.336	0.121	0.302	0.040	595.26	0.287
Scraper	Diesel	2277002018	150	1.005	2.437	0.288	0.279	0.104	0.219	0.029	536.18	0.208

(C) Regional Emissions and Emission Factors for off-highway vehicles from U.S. EPA's NONROAD model for El Paso County, Colorado and evaluation year 2014. NONROAD provides Regional Emissions for PM2.5, PM10, total hydrocarbons (THC), and VOCs, but provides Emission Factors only for CO, NOx, PM10, SO2, CO2, and THC.
(D) Emission factor for PM2.5 = (Emission Factor for PM10) × (PM2.5-to-PM10 Regional Emissions Ratio).
(E) Emission Factor for VOCs = (Emission Factor for THC) × (VOC-to-THC Regional Emissions Ratio).
(F) Emission Factor for HAPs = (VOC Emission Factor) × (Ratio of HAP-to-VOC Emission Factors from the EPA's MOBILE6.2 model output for HDDV on-road contruction vehicles in Table 2).

Emission Calculations

Equipment [G] Description	Total Operating Hours by Construciton Activity				Total Hours	Engine Size (hp)	NonRoad [H] Load Factor	Total Emissions [I] (tons)							
	Grading	Building	Paving	Utilities				CO	NOx	PM10	PM2.5	SO2	VOCs	HAPs	CO2
Air Compressor	---	31,264	---	---	31,264	40	43%	0.758	2.539	0.161	0.156	0.069	0.156	0.021	349
Backhoe/Loader	952	---	---	5,552	6,504	75	21%	0.614	0.589	0.094	0.091	0.016	0.117	0.016	78
Bulldozer	7,152	---	---	5,552	12,704	150	59%	1.239	2.984	0.357	0.346	0.129	0.269	0.036	664
Crane	---	31,264	---	696	31,960	100	43%	2.928	5.111	0.517	0.501	0.177	0.459	0.061	893
Excavator	---	---	---	6,944	6,944	100	59%	1.161	1.210	0.182	0.177	0.051	0.105	0.014	269
Generator	---	20,848	---	---	20,848	40	43%	0.851	1.945	0.171	0.166	0.048	0.228	0.030	233
Grader	3,576	---	---	---	3,576	100	59%	0.626	0.668	0.095	0.092	0.027	0.059	0.008	138
Paver	---	---	240	---	240	150	59%	0.024	0.061	0.007	0.007	0.002	0.005	0.001	13
Roller	712	---	240	---	952	75	59%	0.124	0.173	0.016	0.016	0.006	0.014	0.002	28
Scraper	2,384	---	---	---	2,384	150	59%	0.234	0.567	0.067	0.065	0.024	0.051	0.007	125
TOTALS								**8.56**	**15.85**	**1.67**	**1.62**	**0.55**	**1.46**	**0.19**	**2790**

(G) Information on equipment types, fuel, engine size, and operating hours are based on scaling current proposed project to similar type of project activity as listed in the Environmental Assessment - Base General Plan (Schriever AFB, September 2007).
(H) Load Factors based on statistical values listed in the NONROAD model ACTIVITY.DAT database file.
(I) Total Emissions (tons) = Emission Factor (g/hp-hr) x Engine Size (hp) x Operating Hours (hr) x Load Factor (%) x (1 lb / 453.6 g) x (1 ton / 2000 lb)

ADDITIONAL ACTIVITIES INCLUDED IN ALTERNATIVE 2
ACCELERATED CONSTRUCTION ALTERNATIVE
(Activity ID Numbers 15 - 24)

Table 4
Construction Phase - Fugitive Dust
Emissions from Construction Activity

Emission Factors

Description	Silt Content (%)	Silt Loading (g/m^2)	Material Moisture Content (%)	Average Vehicle Weight (ton)	Emissions Factor (lb/hr)	
					PM10	PM2.5
Grading - Bulldozing [A]	6.9	-	7.9	-	0.753	0.414
Description					Emissions Factor (lb/VMT)	
					PM10	PM2.5
Trucks on Paved Roads [B]	-	0.6	-	10	0.014	0.004
Trucks on Unpaved Roads [C]	8.5	-	-	10	1.891	0.189

(A) Emission Factors determined from US EPA AP-42 Section 11.9 (Oct 1998):

- PM10 (lb/hr) = $0.75 \times (1.0 \times s^{1.5}) / M^{1.4}$ (AP-42 Table 11.9-1 Bulldozing equation for PM ≤15 µm, scaling factor for PM ≤10 µm, and footnote d)

- PM2.5 (lb/hr) = $0.105 \times (5.7 \times s^{1.2}) / M^{1.3}$ (AP-42 Table 11.9-1 Bulldozing equation for TSP ≤30 µm, scaling factor for PM ≤2.5 µm, and footnote e)

where s = silt content (%) and M = moisture content (%). The silt content and moisture content for western overburden was estimated from AP-42 Table 11.9-3 (geometric mean).

(B) Emission Factors for Paved Roads determined from US EPA AP-42 Section 13.2.1 (Jan 2011), Equation (1):

- PM10 (lb/VMT) = $0.0022 \times (sL^{0.91}) / (W^{1.02})$

- PM2.5 (lb/VMT) = $0.00054 \times (sL^{0.91}) / (W^{1.02})$

where VMT = vehicle miles traveled, sL = silt loading of the road surface (g/m^2) and W = average vehicle weight (tons). Constants for the equations were taken from Table 13.2.1-1. The silt loading was taken from AP-42 Table 13.2.1-2 as the ubiquitous baseline for low average daily traffic roads (non-winter conditions). For vehicle weight, an average of unloaded and loaded truck weight is assumed.

(C) Emission Factors for Unpaved Roads determined from US EPA AP-42 Section 13.2.2 (Nov 2006), Equation (1a):

- PM10 (lb/VMT) = $1.5 \times (s/12)^{0.9} / (W/3)^{0.45}$

- PM2.5 (lb/VMT) = $0.15 \times (s/12)^{0.9} / (W/3)^{0.45}$

where VMT = vehicle miles traveled, s = silt content of surface material (%) and W = average vehicle weight (tons). Constants for the equations were taken from Table 13.2.2-2. The silt content was taken from AP-42 Table 13.2.2-1 as the mean for construction sites. For vehicle weight, an average of unloaded and loaded truck weight is assumed.

Emission Calculations

Description	Total Hours (hr)	Total Vehicle Miles (mi)	Total Emissions (Tons)	
			PM10	PM2.5
Grading - Bulldozing [D]	3,656	---	1.38	0.76
Trucks on Paved Roads [E]	---	95,400	0.69	0.17
Trucks on Unpaved Roads [E]	---	10,848	10.25	1.03
TOTALS			**12.32**	**1.95**

(D) Total Emissions (tons) = Emission Factors (lb/hr) × Total Operating Hours (hr) × (1 ton / 2000 lb), where:
Total Operating Time (hr) = Disturbed Area (acres) × [Grading Time (day/acre) + Fill & Level Time (day/acre)] × Work Day (hr/day)

- *Disturbed Area: 123.5 acres*
- *Grading Time: 1.2 day/acre*
- *Fill & Leveling Time: 2.5 day/acre*
- *Work Day: 8 hr/day*

(E) Total Emissions (tons) = Emission Factors (lb/VMT) × Total Vehicle Miles (mi) × (1 ton / 2000 lb), where:
Total Vehicle Miles (mi) = Round Trip (mi/truck) × Number of Vehicles (truck/hr) × Work Day (hr/day) × Construction Time (days)

	Paved Roads	Unpaved Roads	
• Round Trip:	15	2	mile/truck
• Number of Vehicles:	3	3	truck/hr
• Work Day:	8	8	day/acre
• Construction Time:	265	226	hr/day

ADDITIONAL ACTIVITIES INCLUDED IN ALTERNATIVE 2
ACCELERATED CONSTRUCTION ALTERNATIVE
(Activity ID Numbers 15 - 24)

Table 5
Construction - Hot-Mix Asphalt Plant and Pavement Curing

Emission Factors

Activity	Emission Factors (lb/ton of asphalt)							
	CO	NOx	PM10	PM2.5	SO2	VOCs	HAPs	CO2
Hot-Mix Asphalt [A]	0.40	0.025	0.027	0.023	0.0046	0.0082	0.0076	37
Hot-Mix Asphalt Pavement Curing [B]	---	---	---	---	---	0.04	---	---

(A) Emission factors for hot-mix asphalt plants from U.S. EPA AP-42 Section 11.1 (Tables 11.1-1, 11-1-2, 11.1-5, 11.1-6, 11.1-9), assuming batch mixing, natural gas firing, fabric filter control of particulates, and ratio of PM2.5 to PM10 based on particle size cumulative mass distribution % of each for fabric filter. PM2.5 emission factor = (PM10 emission factor from Table 11.1-1) × (33% PM2.5 / 39% PM10 from Table 11.1-2).

(B) EPA AP-42 Section 4.5 for asphalt paving states that VOC emissions from hot-mix and emulsified asphalt are minor, and provides emission factors for cutback asphalt only. Since, cutback asphalt will not be used, the following literature was used to obtain emission factors for hot-mix asphalt curing:

- *VOC emission factor for hot-mix asphalt from California Air Resource Board, Comparison of Asphalt Paving Emission Factors, 5/11/2005.*
- *There are no NOx, PM2.5, or SO2 emissions associated with curing of asphalt pavement.*

Emission Calculations

Activity	Hot-Mix Asphalt [C] (tons)	Emissions [D] (tons)							
		CO	NOx	PM10	PM2.5	SO2	VOCs	HAPs	CO2
Hot-Mix Asphalt [C]	13,611	2.72	0.17	0.18	0.16	0.03	0.06	0.05	252
Hot-Mix Asphalt Pavement Curing [D]		---	---	---	---	---	0.27	---	---
TOTAL		**2.72**	**0.17**	**0.18**	**0.16**	**0.03**	**0.33**	**0.05**	**252**

(C) Asphalt quantity is estimated based on scaling of similar type of project activity listed in the Environmental Assessment - Base General Plan (Schriever AFB, September 2007). Asphalt type is assumed to be hot-mix asphalt.

(D) Emissions (tons) = Quantity of Hot-Mix Asphalt (tons) × Emission Factor (lb/ton of asphalt) × (1 ton / 2000 lb).

ADDITIONAL ACTIVITIES INCLUDED IN ALTERNATIVE 2
ACCELERATED CONSTRUCTION ALTERNATIVE
(Activity ID Numbers 15 - 24)

Table 6
Construction Phase - Surface Coating

Emission Factors

Activity	Emission Factor [A, B, C, D] (tons)							
	CO	NOx	PM10	PM2.5	SO2	VOCs	HAPs	CO2
Surface Coating - Interior	---	---	---	---	---	3.175	---	---

(A) There are no CO, NOx, or SO2 emissions associated with surface coating.

(B) Since painting is performed indoors, particulate matter emissions escaping to the outside atmosphere are considered to be negligible.

(C) VOC content assumed to be the higher of the federal VOC limit of 250 g/l (2.09 lb/gal) for interior flat paints and 380 g/l (3.175 lb/gal) for interior non-flat paints. These federal limits are defined in 40 CFR 59 Subpart D "National Volatile Organic Compound Emission Standards for Architectural Coatings". This regulation is referred to as the AIM (Architectural and Industrial Maintenance) Rule.

(D) 100% of volatile component is assumed to be emitted indoors and then escape to the atmosphere through building ventilation.

Emission Calculations

Activity	Paint Usage [E] (gallons)	Emissions [F] (tons)							
		CO	NOx	PM10	PM2.5	SO2	VOCs	HAPs	CO2
Surface Coating - Interior	8,947	---	---	---	---	---	**14.20**	---	---

(E) Paint usage estimated as follows:

Total Building Floor Coverage =	*894,700*	*sq ft (total for all planned projects)*
Scaling Factor for Painted Surface =	*4.00*	*to account for floor, wall, and ceiling surfaces*
Surface Area to be Painted =	*3,578,800*	*sq ft (Surface Area = Building Area x Scaling Factor)*
Paint Coverage =	*400*	*sq ft/gallon*
Paint Quantity =	*8,947*	*gallons (Quantity = Surface Area / Paint Coverage)*

(F) Emissions (tons) = Paint Usage (gal) × Emission Factor (lb/gal) × (1 ton / 2000 lb).

ADDITIONAL ACTIVITIES INCLUDED IN ALTERNATIVE 2
ACCELERATED CONSTRUCTION ALTERNATIVE
(Activity ID Numbers 15 - 24)

Table 7
Operational Phase - Space Heating
Annual Emissions from Natural Gas Combustion

Emission Factors

Activity	Emission Factor [A] ($lb/10^6$ cu ft natural gas/yr)							
	CO	NOx	PM10	PM2.5	SO2	VOCs	HAPs [B]	CO2
Additional Space Heating	84.0	100.0	7.6	7.6	0.6	5.5	1.89	120,000

(A) Emission factors from EPA AP-42 Section 1, External Combustion (July 1998) for natural gas combustion units < 100 million Btu/hr.

(B) HAP emission factor is the sum of all individual HAP emission factors.

Emission Calculations

Activity	Increased Fuel Use [C] (10^6 cu ft/year)	Emissions [E] (ton/yr)							
		CO	NOx	PM10	PM2.5	SO2	VOCs	HAPs	CO2
Additional Space Heating	33.864	**1.42**	**1.69**	**0.13**	**0.13**	**0.01**	**0.09**	**0.03**	**2032**

(C) The proposed projects will result in an increase in the facility's fuel usage for comfort heating based on the following information:

Fuel Type =	*Natural Gas*	
Additional Area =	*894,700*	*sq ft*
Fuel Rate =	*7.57*	*cu ft/sq ft/month (approximated from basewide annual fuel consumption, total heated area, and 6 month heating period).*
Heating Period =	*5*	*month/year*
Increased Fuel Use =	*33,864,395*	*cu ft/yr = Additional Area (sq ft) × Fuel Rate (cu ft/sq ft/month) × Heating Period (month/yr)*

(D) Annual emissions (ton/yr) = Annual Fuel Usage (10^6 cu ft/yr) x Emission Factor ($lb/10^6$ cu ft) × (1 ton / 2000 lb).

ADDITIONAL ACTIVITIES INCLUDED IN ALTERNATIVE 2
ACCELERATED CONSTRUCTION ALTERNATIVE
(Activity ID Numbers 15 - 24)

Table 8
Operational Phase - Emergency Generators
Annual Emissions from Diesel Fuel Combustion

Emission Factors

Activity	Emission Factor [A] (lb/hp-hr)							
	CO	NOx	PM10 [B]	PM2.5 [B]	SO2 [C]	VOCs [D]	HAPs [E]	CO2
Emergency Generator (>600 hp)	0.0055	0.024	0.0006	0.0005	0.000012	0.00064	0.000011	1.16

(A) Emission Factors from AP-42 Section 3.4, Large Stationary Diesel Engines (October 1996), for uncontrolled diesel engines.
(B) PM10 emission factor = (PM emission factor of 0.0007 lb/hp-hr) × (0.0573/0.0697 PM10-to-PM scaling from AP-42 Table 3.4-2)
PM2.5 emission factor = (PM emission factor of 0.0007 lb/hp-hr) × (0.0479/0.0697 PM2.5-to-PM scaling from AP-42 Table 3.4-2)
(C) SO2 emission factor = 0.00809 × Sulfur Content (%) (AP-42 Table 3.4-1). Starting October 2010, ultra-low sulfur content (i.e., 15 ppm = 0.0015%) diesel fuel shall be used (Permit 95EP772 Mod 6).
(D) VOC emission factor = (TOC emission factor from AP-42 Table 3.4-1 of 0.000705 lb/hp-hr) × (91% of TOC as non-methane from AP-42 Table 3.4-1 footnote f).
(E) HAP emission factor is the sum of all individual HAP emission factors.

Emission Calculations

Activity	Output Rating	Operating Hours [F]	Emissions [G] (ton/yr)							
	(hp)	(hr/yr)	CO	NOx	PM10	PM2.5	SO2	VOCs	HAPs	CO2
Emergency Generator (>600 hp)	1,206	240	**0.80**	**3.47**	**0.08**	**0.07**	**0.002**	**0.09**	**0.002**	**168**

(F) The proposed projects will result in an increase in the facility's fuel usage for emergency generators based on the following information:

Fuel Type =	*Diesel*	
Generator Power Output Rating =	*900*	*kW/building*
Power Output of Diesel-Fired Engine =	*1206*	*hp (based on conversion factor of 1 kW = 1.34 hp)*
Number of Buildings =	*4*	*buildings (assumes that emergency generators will only be installed at new mission-critical and security buildings)*
Annual Operating Hours =	*60*	*hr/yr per building (Assumes 5 hours of operation per month for exercise and emergency power generation).*
Total Operating Hours =	*240*	*hr/yr = Annual Operating Hours (hr/yr/building) × Number of Buildings*

(G) Annual emissions (ton/yr) = Power Output Rating (hp) x Total Operating Hours (hr/yr) x Emission Factor (lb/hp-hr) × (1 ton/2000 lb).